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NATIONAL SECURITY RESEARCH DIVISION

Health and Economic Outcomes Among the Alumni of the Wounded Warrior Project

2013

Jennifer L. Cerully, Mustafa Oguz, Heather Krull, Kate Giglio

Sponsored by the Wounded Warrior Project

The research described in this report was sponsored by the Wounded Warrior Project and conducted within the Forces and Resources Policy Center of the RAND National Security Research Division.

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Preface

The nonprofit Wounded Warrior Project (WWP) offers support and raises public awareness of service members who have experienced physical or mental health conditions associated with military service on or after September 11, 2001. Each year, WWP conducts an annual assessment of its members (alumni), to understand how well its programs and services are supporting the mental, physical, and financial well-being of alumni. The RAND Corporation was asked to supplement initial analysis of the 2013 assessment to assist WWP leadership in understanding the impact of WWP programs on alumni mental health, physical health, education, and employment.

This project was sponsored by WWP, and the report is largely intended for the WWP Board of Directors and WWP staff and does not assume statistical expertise. Readers wanting more detail on the analyses presented here are referred to the technical appendixes.

Related RAND publications include *Invisible Wounds of War: Psychological and Cognitive Injuries, Their Consequences, and Services to Assist Recovery* (Tanielian and Jaycox, 2008), *Health and Economic Outcomes in the Alumni of the Wounded Warrior Project* (Krull and Haugseth, 2012), and *Health and Economic Outcomes in the Alumni of the Wounded Warrior Project: 2010–2012* (Krull and Oguz, 2014).

This research was conducted within the Forces and Resources Policy Center of the RAND National Security Research Division (NSRD). NSRD conducts research and analysis on defense and national security topics for the U.S. and allied defense, foreign policy, homeland security, and intelligence communities and foundations and other nongovernmental organizations that support defense and national security analysis.

For more information on the Forces and Resources Policy Center, see http://www.rand.org/nsrd/ndri/centers/frp.html or contact the director (contact information is provided on the web page). Comments or questions about this document should be directed to the project leader, Jennifer Cerully, at jcerully@rand.org.

Contents

Preface iii
Tables vii
Summary ix
Acknowledgments xiii
Abbreviations xv

CHAPTER ONE
Introduction 1
The Purpose of This Report 1
How the Report Is Organized 2

CHAPTER TWO
Overview of 2013 WWP Alumni Survey, Respondents, and Analysis 3
Survey Content 3
Survey Administration 4
Sample Characteristics 4
Selection of Analyses 8
Statistical Techniques 8

CHAPTER THREE
Mental Health Outcomes 11
At Least Half of Alumni Report Mental Health Symptoms and Problems 11
Alumni Report Challenges Accessing Mental Health Care and Seeking Help 13
Alumni Reporting Mental Health Conditions: Female Alumni and Younger Alumni Report More Difficulties and Delays in Getting Care or Not Getting Care 14
Summary 15

CHAPTER FOUR
Physical Health Outcomes 17
Achieving a Healthy BMI Is a Challenge for Over 80 Percent of Alumni 17
BMI Is Related to Other Physical Health Outcomes and Perceptions 18
Mental and Physical Injuries Are Both Related to Perceptions of Health 20
Alcohol Use Is Related to General Self-Reported Health in an Unexpected Way 22
Summary 23

CHAPTER FIVE
Economic Outcomes 25
Half of Alumni Are Employed 25
Few Alumni Access Employment and Education Benefits 25
Type of Injury Is Related to Participation in Employment and Education Benefit Programs 26
High VA Disability Ratings and Many Injury Types Are Associated with Unemployment 26
Summary 27

CHAPTER SIX
Discussion 29
Empowering Wounded Warriors in Mind and Spirit 29
Empowering Wounded Warriors in Body 29
Empowering Wounded Warriors Economically 30

TECHNICAL APPENDIX A
Interpretation of Regression Analyses 31
Multiple Regression 31
Logistic Regression 31
Explanatory Variables 32
Statistical Significance 32
Weighting 32

TECHNICAL APPENDIX B
Analyses for Chapter 3 35

TECHNICAL APPENDIX C
Analyses for Chapter 4 41
Technical Appendix C.1: Alumni Characteristics and General Self-Reported Health 41
Technical Appendix C.2: Alumni Characteristics and Limitations Due to Physical Health 46
Technical Appendix C.3: Alumni Characteristics and Exercise Frequency 51
Technical Appendix C.4: Alumni Characteristics and Limitations of Doing Vigorous Activity 56

TECHNICAL APPENDIX D
Analyses for Chapter 5 63
Technical Appendix D.1: Alumni Characteristics and Use of VA's Vocational Rehabilitation and Employment Program 63
Technical Appendix D.2: Alumni Characteristics and Use of the Post-9/11 GI Bill 67
Technical Appendix D.3: Alumni Characteristics and Labor Pool Status 72
Technical Appendix D.4: Alumni Characteristics and Employment Status 77

TECHNICAL APPENDIX E
Fact Sheets 83

References 85

Tables

2.1. 2013 WWP Alumni Survey Respondent Characteristics 5
2.2. Explanatory Variables Used in Regression Analyses 9
3.1. Prevalence of Probable Depression, PTSD, and Problem Drinking Among 2013 WWP Alumni 12
3.2. Proportion of WWP Alumni Screening Positive for a Mental Health Condition Who Report Having Difficulty Getting, Putting Off Getting, or Not Getting Mental Health Care 13
3.3. Top-Five Reported Barriers to Getting Mental Health Care 14
4.1. Prevalence of Normal Weight, Overweight, and Obese WWP Alumni 17
4.2. BMI and Physical Health Outcomes 19
4.3. Top Reported Barriers to Exercise, Sports, or Physical Activity 20
4.4. Injury Type and General Self-Reported Health Status 21
4.5. Injury Type and Exercise Frequency 22
4.6. Injury Type and Limitations in Performing Vigorous Activity 23
4.7. Alcohol Use and General Self-Reported Health Status 24
A.1. Explanatory Variables Used in Regression Analyses 33
B.1. Variables Used in Logistic Regression of Having Difficulty Getting, Putting Off Getting, or Not Getting Mental Health Care on Alumni Characteristics 35
B.2. Relationship Among Explanatory Variables and Reports of Difficulties Getting, Delays Getting, or Not Getting Mental Health Care 36
C.1. Variables Used in Logistic Regression of General Self-Reported Health on Alumni Characteristics 41
C.2. Relationship Among Explanatory Variables and General Self-Reported Fair or Poor Health 42
C.3. Variables Used in Regression of Limitations Due to Physical Health on Alumni Characteristics 47
C.4. Relationship Among Explanatory Variables and Limitations Due to Physical Health 47
C.5. Variables Used in Logistic Regression of Exercise Frequency on Alumni Characteristics 51
C.6. Relationship Among Explanatory Variables and Exercise Frequency 52
C.7. Variables Used in Logistic Regression of Limitations of Doing Vigorous Activity on Alumni Characteristics 57
C.8. Relationship Among Explanatory Variables and Reporting Being "Limited a Lot" in Vigorous Activities 57
D.1. Variables Used in Logistic Regression of VR&E Program Use on Alumni Characteristics 63
D.2. Relationship Among Explanatory Variables and Using VA's Vocational Rehabilitation and Employment Program 64

D.3. Variables Used in Logistic Regression of Use of the Post-9/11 GI Bill on Alumni Characteristics..... 68
D.4. Relationship Among Explanatory Variables and Using the Post-9/11 GI Bill..... 68
D.5. Variables Used in Logistic Regression of Labor Pool Status on Alumni Characteristics..... 72
D.6. Relationship Among Explanatory Variables and Being out of Labor Pool..... 73
D.7. Variables Used in Logistic Regression of Employment Status on Alumni Characteristics..... 78
D.8. Relationship Among Explanatory Variables and Being Employed (Full Time or Part Time)..... 78

Summary

The nonprofit Wounded Warrior Project (WWP) offers support for and raises public awareness of service members who have experienced physical or mental health conditions associated with their service on or after September 11, 2001. Since 2002, the organization has strived toward supporting Wounded Warriors through three strategic objectives:

1. Ensure that Wounded Warriors are well adjusted in mind and spirit.
2. Ensure that Wounded Warriors are well adjusted in body.
3. Ensure that Wounded Warriors are economically empowered.

Each year, WWP conducts an annual assessment of its members (known as *alumni*), to understand how well its programs and services are achieving the three objectives—that is, supporting the mental, physical, and financial well-being of alumni. The survey administrator, Westat, makes general survey results available to WWP in an initial report.

After the initial Westat results were presented to WWP, the organization, as well as its Physical Health and Wellness Program staff and Policy and Government Affairs team, asked RAND to offer an additional interpretation of survey results to supplement those by Westat. This report documents RAND's supplemental analysis.

How to Use This Analysis

RAND's interpretation does not evaluate the impact or success of WWP programs. Rather, the results here are designed for use as a tool for WWP to understand the needs and status of its current alumni. More specifically, the physical, mental, and financial status and self-perceptions of WWP alumni are presented to provide WWP leaders with an opportunity to take a step back and reflect upon the needs of current participants in order to determine how best to meet the needs of this group. The results here may be used to foster further examination of the ways WWP can serve and support this constituency of alumni, thus better realizing WWP's three strategic objectives.

WWP 2013 Alumni Survey, Survey Respondents, and Analytic Method

The analysis is based on a sample of WWP alumni drawn from the 2013 WWP Alumni Survey. Survey questions cover alumni characteristics as well as questions pertaining to mental

and physical health and educational and economic outcomes. Out of 26,886 alumni eligible to take the survey, 13,956 chose to participate. This resulted in a response rate of 51.9 percent.

On average, most 2013 survey respondents were white (73 percent), male (88 percent), between ages 26 to 35 (49 percent), and married (65 percent). In terms of education, most (62 percent) had not completed an associate's degree or higher. Most respondents had served in the Army (66 percent), were out of the military (67 percent), and had reached pay grades between E5 and E9 (62 percent). Because WWP serves Wounded Warriors, it is not surprising that most respondents had a Department of Veterans Affairs (VA) disability rating of 50 percent or higher (59 percent). Respondents reported many different types of service-related injuries and conditions, with the highest percentages reporting posttraumatic stress disorder (PTSD) (76 percent); anxiety (75 percent); depression (70 percent); severe back, neck, or shoulder problems (58 percent); and tinnitus (53 percent).

The data were assembled to determine underlying variables of interest, and regression was employed to estimate the quantitative effect of variables upon the physical and mental health and educational and economic outcomes of survey participants. Results of the survey sample were weighted to represent the entire population of WWP alumni, not just survey respondents. However, the data analyzed are from a single point in time, and thus the relationships among variables cannot be interpreted as being causal in nature.

At Least Half of Alumni Have Mental Health Symptoms and Face Barriers to Mental Health Care

Many alumni identified themselves as suffering or having suffered from mental health conditions in the 2013 WWP survey. Screening measures allowed assessment of probable depression, PTSD, and problem drinking at the time of the survey. In all, WWP alumni screened positively for probable depression, PTSD, and problem drinking at rates greater than 50 percent—higher than Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans in general (Tanielian and Jaycox, 2008; Calhoun et al., 2008).

Of the alumni screening positive, 37 to 47 percent reported having difficulty accessing mental health care, delaying it, or not getting the care they need. They attribute these challenges to accessing care to reasons ranging from practical barriers to care access (e.g., canceled appointments) to barriers related to stigma and discrimination (e.g., fear of negative repercussions for their careers). Female alumni and younger alumni reported slightly more difficulty getting, putting off getting, or not getting the mental health care they need relative to male alumni and older alumni.

Physical Health of Alumni Is Challenged by Unhealthy Weight

Because obesity is linked with many negative health outcomes, data on the body mass index (BMI) of alumni and the relationship of BMI to other physical health outcomes are important to WWP. A large proportion of alumni are overweight (42 percent) or obese (41 percent). This rate of obesity is slightly higher than the estimate of 35.7 percent for the general U.S. adult population (Ogden et al., 2012).

Obese alumni were more likely to report their general health status as being fair or poor, and they experience greater limitations in their daily activities and work due to their physical health than do the alumni who are overweight or of normal weight.

In general, WWP alumni engage in moderate-intensity physical activity or exercise (such as brisk walking, jogging, or cycling) a little more than twice per week (on average). Regardless of BMI, the most frequently endorsed barriers to exercise and physical activity are discomfort in social situations, concerns about safety and reinjury, and finding time to train and participate. Obese WWP alumni endorsed these barriers at greater rates than overweight and healthy-weight alumni.

Survey results also made clear the relationship between the mental and the physical health of alumni. Mental health conditions and physical injuries were both associated with reports of fair or poor health status. However, perhaps counterintuitively, those who do not consume alcohol were most likely to indicate fair or poor health status, followed by those who are nonproblem drinkers, and, finally, potential problem drinkers.

Many Alumni Are Unemployed and Do Not Access Veteran Employment and Education Benefits

The 2013 survey results suggest that unemployed alumni (whether looking for work or not) make up almost half of all WWP alumni. However, the combined number of alumni employed full time and part time surpass the number of nonworking groups at 52 percent (45 percent work full time and 7 percent work part time). Still, 17.8 percent of alumni are unemployed and looking for work. Those with high VA disability ratings were more likely to be not working, and alumni reporting certain injury types—depression; spinal cord injury; severe back, neck, or shoulder problems; severe knee injuries or problems; or other severe mental injuries—were less likely to be employed than alumni who did not report these injuries.

Overall, there is low alumni participation in veteran-specific employment and education programs. Only about 9 percent of the WWP alumni eligible for the VA Vocational Rehabilitation and Employment Program (VR&E) reported that they are using VR&E benefits, and only about 27 percent of all alumni reported using the Post-9/11 GI Bill.[1] Alumni who reported amputation, traumatic brain injury (TBI), or severe back, neck, or shoulder problems were slightly more likely to use the VR&E benefits than those who did not report these injury types. Alumni with most types of injuries were equally likely to use Post-9/11 GI Bill benefits, with the exception of alumni with amputation or who screened positive for probable depression. These alumni were less likely to use Post-9/11 GI Bill benefits.

Discussion

Several topics are presented that may warrant further discussion by WWP staff. These include carefully considering barriers to mental health care when determining strategies for improving

[1] Only VR&E-eligible alumni, who are defined here as the alumni with a VA disability rating of 10 percent or more, are included in the VR&E use analysis. Alumni with a pending VA rating, no VA rating, or with a VA rating of 0 are excluded. Seventy percent of the total sample (67 percent of the alumni), 9,833 respondents, are eligible for VR&E.

mental health and mental health care access, particularly for alumni reporting mental health conditions, female alumni, and younger alumni. Other topics for discussion include considering what interventions and program efforts might be used to promote weight loss among alumni and exploring the issue of overweight and obesity more thoroughly. Finally, the issue of how best to encourage use of education and employment benefits may warrant further consideration.

Acknowledgments

We gratefully acknowledge the Wounded Warrior Project (WWP) for the opportunity to conduct this work, and we especially thank the many WWP alumni who completed the survey. We thank Jennifer Silva and Anna Sivonda at WWP for serving as our main points of contact and for their insight into WWP priorities and efforts. We thank Westat for collecting the data and providing them to us. Finally, we acknowledge Nicole Eberhart and Coreen Farris for their thorough and thoughtful reviews of this report.

Abbreviations

AUDIT-C	Alcohol Use Disorders Identification Test, Alcohol Consumption Test
BMI	body mass index
DoD	Department of Defense
NILF	not in labor force
NSRD	National Security Research Division
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OLS	ordinary least squares
PC-PTSD	Primary Care PTSD Screen
PHQ-8	Patient Health Questionnaire (eight-item version)
PTSD	posttraumatic stress disorder
SD	standard deviation
SF-36	36-Item Short Form Health Survey
TBI	traumatic brain injury
VA	Department of Veterans Affairs
VR&E	Vocational Rehabilitation and Employment Program
WWP	Wounded Warrior Project

CHAPTER ONE

Introduction

This document is intended to provide insight into the mental, physical, and economic well-being of current and former service members involved with the Wounded Warrior Project (WWP). WWP is a national, nonpartisan, charitable organization headquartered in Jacksonville, Florida. The stated mission of WWP is "to honor and empower Wounded Warriors." The WWP's purpose is "to raise awareness and to enlist the public's aid for the needs of injured service members, to help injured servicemen and women aid and assist each other, and to provide unique, direct programs and services to meet their needs." WWP refers to its members as *alumni*, and to become WWP alumni, service members or veterans must have incurred a military service-related injury (i.e., a physical or mental health condition connected to their military service) on or after September 11, 2001.

WWP includes three objectives in its 2013–2017 strategic plan. These objectives guide the organization's work:

- Strategic objective 1: ensure that Wounded Warriors are well adjusted in mind and spirit.
- Strategic objective 2: ensure that Wounded Warriors are well adjusted in body.
- Strategic objective 3: ensure that Wounded Warriors are economically empowered.

WWP is interested in monitoring progress in meeting these three objectives. One tool WWP uses to assess its progress in meeting the strategic objectives is an annual survey of WWP alumni. The survey contains questions about alumni mental health and well-being, physical health, and educational and economic outcomes, as well as sociodemographic characteristics. General survey results are available in a report drafted by Westat, the company that administered the survey (Franklin et al., 2013).

It should be noted that this report does not serve as an evaluation of the impact or success of WWP programs. Rather, the survey and this report containing results are both designed to serve as a tool for WWP to understand the challenges faced by its alumni. As such, the results here are intended to shed light on the areas where Wounded Warriors face the greatest needs in an effort to provide the WWP Board of Directors and staff with the information they need to make decisions about their efforts and policies.

The Purpose of This Report

This report provides a detailed analysis of a subset of the 2013 WWP survey data. We primarily focus upon the relationship between the type of service-related injury sustained by

WWP alumni and mental health, physical health, and economic outcomes. Our work builds on the initial interpretation offered by Westat, which provides top-line results for all items in the survey. Here we aim to provide more-nuanced analysis that explores associations among alumni characteristics and health and economic outcomes. These analyses were conducted in response to conversations with WWP and requests from the WWP Physical Health and Wellness Program staff and the WWP Policy and Government Affairs team. Thus, this report can be used to guide WWP programs as the organization continues its work in honoring and empowering Wounded Warriors.

Readers should keep in mind several important points as they review the results of this study. First, the data analyzed are from a single survey administration, and thus the relationships among variables cannot be interpreted as being causal in nature. Consider a hypothetical example in which an analysis shows that Air Force respondents report poorer health status than Army respondents. It cannot be concluded that being in a specific branch of service caused poorer health. A more appropriate interpretation is that there is some relationship between branch of service and health status, but the direction is not clear. Possible explanations may include that branch of service may influence health status, health status may influence choice of branch of service, or a third factor may influence both.

Second, the results reported here are weighted. This means that the data have been adjusted so that results can be interpreted as being representative of all WWP alumni, not just those who responded to the survey. Note that this is a change from results presented in past reports (Krull and Haugseth, 2012; Krull and Oguz, 2014), when these weights were not available. The weights used in analyses were developed by Westat and are described in detail in its report (Franklin et al., 2013).

How the Report Is Organized

This report contains the results of the analysis of a subset of the 2013 WWP alumni survey data. Chapter 2 briefly describes the survey methodology and analysis strategy used to obtain the results reported here. Chapter 3 is designed to inform strategic objective 1 and contains results related to mental health and well-being. Chapter 4 contains results on physical health that correspond with strategic objective 2. Chapter 5 informs strategic objective 3 and contains findings relevant to the economic well-being of alumni, and Chapter 6 presents several areas for consideration for WWP as it determines how best to address alumni needs.

The details of regression analyses presented throughout, including tables of regression coefficients and odds ratios, are contained in the technical appendixes at the end of the report for those wishing to review the details. An additional appendix contains two fact sheets that provide concise descriptions of main findings to facilitate dissemination of results to various audiences.

CHAPTER TWO

Overview of 2013 WWP Alumni Survey, Respondents, and Analysis

This chapter provides context to our analysis of the 2013 WWP Alumni Survey. First, we describe the administration of the survey, its content, and respondent characteristics. More-detailed information on each of these topics is available in the report generated by Westat, the company administering the survey (Franklin et al., 2013). We then provide a brief description of the analysis strategy used to generate the results presented in this report. We briefly address how the analyses reported here were selected and then describe the statistical techniques used to carry out analyses. A description of the variables used in analyses is provided, followed by a discussion of some limitations of the results herein.

Further details pertaining to our analytic strategy are documented in Technical Appendix A, where we offer a more in-depth guide to interpreting the regression analysis that is the foundation of this study.

Survey Content

The 2013 WWP Alumni Survey is the third in a series of annual surveys of WWP alumni, and it is based on content developed jointly by RAND and Westat for the initial WWP Alumni Survey in 2011. Survey questions cover alumni characteristics, mental health outcomes, physical health outcomes, educational outcomes, and economic outcomes. The outcomes addressed in this report are:

Alumni Characteristics

- Demographic characteristics (e.g., age, gender, race)
- Military service (e.g., branch of service, service component, highest pay grade)
- Type of service-related injury
- Department of Veterans Affairs (VA) disability rating

Mental Health Outcomes

- Validated screening measures for probable depression, posttraumatic stress disorder (PTSD), problem drinking
- Difficulties in getting needed mental health care

Physical Health Outcomes

- Body mass index (BMI)
- General self-reported health status
- Exercise frequency
- Physical limitations

Economic and Educational Outcomes

- Level of education being pursued
- Use of government work and education benefits
- Employment status.

Survey Administration

Westat administered the survey online during a six-week period in March and April of 2013. All 26,892 WWP alumni in the WWP database were invited to participate, and they were offered a small gift (an Under Armour sackpack with the WWP logo) as an incentive to participate.

Sample Characteristics

In all, 13,956 WWP alumni (that is, 51.9 percent of the 26,886 eligible alumni in the database) completed the survey. A full listing of the characteristics of the WWP alumni respondents are reported in Table 2.1. The column containing unweighted percentages shows the percentage of survey respondents who endorsed the response in each row.

In terms of demographic characteristics, 73 percent of survey respondents were white and 88 percent were male. Nearly half of the sample was between ages 26 and 35, and 65 percent were married. In terms of education, most (62 percent) had not completed an associate's degree or higher. Nearly half of respondents (45 percent) were employed full time. Most respondents had served in the Army (66 percent), were out of the military (67 percent), and had reached pay grades between E5 and E9 (62 percent). Because WWP serves Wounded Warriors, it is not surprising that most respondents had a VA disability rating of 50 percent or higher (59 percent). Respondents reported a number of different types of service-related injuries, with the largest percentages reporting PTSD (76 percent); anxiety (75 percent); depression (70 percent); severe beck, neck, or shoulder problems (58 percent); or tinnitus (53 percent).

Table 2.1
2013 WWP Alumni Survey Respondent Characteristics

Characteristic	Number of Respondents	Unweighted Percentage of Total Number of Respondents
Sample size	13,956	
Gender		
Male	12,278	88.4
Female	1,606	11.6
Age		
18–25	828	6.0
26–30	3,243	23.4
31–35	3,551	25.6
36–40	2,122	15.3
41–45	1,860	13.4
46–50	1,319	9.5
51–55	622	4.5
56+	346	2.5
Race/ethnicity[a]		
White	10,098	72.7
Black or African-American	1,352	9.7
Hispanic or Latino	2,123	15.3
American Indian or Alaska Native	575	4.1
Asian	383	2.8
Native Hawaiian or other Pacific Islander	163	1.2
Other	328	2.4
Multiple races/ethnicities selected	944	6.8
Marital status		
Married	9,010	64.8
Previously married (widowed, divorced, separated)	2,802	20.2
Never Married	2,089	15.0
Educational attainment		
Less than 12th grade	35	0.3
High school diploma	1,925	13.8
GED	473	3.4
Business/tech/vocational	568	4.1
Some college (< 1 year)	1,940	13.9

Table 2.1—Continued

Characteristic	Number of Respondents	Unweighted Percentage of Total Number of Respondents
Educational attainment		
Some college (1+ year)	3,686	26.4
Associate's degree	1,887	13.5
Bachelor's degree	2,380	17.1
Master's degree	924	6.6
Professional/doctorate	122	0.9
Employment status		
Full time	6,215	44.7
Part time	1,001	7.2
Unemployed or NILF[b]	6,740	48.1
Unemployed[c]	1,574	17.9
NILF[d]	5,166	37.0
Health insurance[a]		
None	702	5.0
Private insurance	2,795	20.0
Medicare	1,632	11.7
Medicaid	294	2.1
Department of Veterans Affairs (VA)	7,635	54.8
Other government (TRICARE, CHAMPUS, CHAMPVA, etc.)	6,804	48.8
Other	297	2.1
Military status		
Active component	2,083	15.0
Activated National Guard or Reserve	1,071	7.7
National Guard or Reserve (not activated)	1,425	10.3
Out of the military	9,298	66.9
Retired (medical)	4,307	30.9
Retired (nonmedical)	904	6.5
Separated or discharged	4,098	29.4
Branch of service		
Army	9,193	66.1
Marine Corps	2,456	17.7
Air Force	1,102	7.9

Table 2.1—Continued

Characteristic	Number of Respondents	Unweighted Percentage of Total Number of Respondents
Branch of service		
Navy	1,274	9.1
Coast Guard	57	0.4
More than one branch	761	5.5
Highest pay grade[e]		
E1–E4	4,089	29.4
E5–E9	8,631	62.0
O1–O3	527	3.8
O4–O6	502	3.6
W1–W5	170	1.2
Total number of deployments		
0	552	4.1
1	4,306	31.6
2	3,968	29.1
3+	4,815	35.3
VA disability rating (%)		
0	68	0.5
10–20	591	4.3
30–40	1,131	8.1
50–60	1,724	12.4
70–80	2,647	19.1
90–100	3,764	27.1
No VA disability rating	1,997	14.4
Claim pending	1,974	14.2
Type of service-related injury reported[a,f]		
Amputation	481	3.5
Anxiety	10,348	74.6
Blind or severe visual loss	460	3.3
Burns (severe)	377	2.7
Depression	9,669	69.7
PTSD	10,596	76.4
Severe back, neck, or shoulder problems	8,084	58.3
Severe hearing loss	2,478	17.9

Table 2.1—Continued

Characteristic	Number of Respondents	Unweighted Percentage of Total Number of Respondents
Type of service-related injury reported[a, f]		
Severe knee injuries or problems	5,241	37.8
Spinal cord injury	2,116	15.3
Traumatic brain injury (TBI)	6,176	44.5
Tinnitus	7,364	53.1
Other severe physical injuries	4,146	29.9
Other severe mental injuries	1,585	11.4
No injury reported	174	1.3

NOTE: Some responses may sum to less than 100 percent due to missing responses or rounding. In cases where more than one response could be selected, totals may sum to greater than 100 percent.

[a] More than one response could be selected.

[b] Respondents who reported being unemployed but indicated that they did not look for a job in the preceding four weeks were assumed to be not in the labor force (NILF).

[c] The unemployed figure includes respondents who were not working (either full or part time) but who had looked for a job in the past four weeks and could have accepted a job offer if they received one in the past week or who could have accepted a job offer except for a temporary illness. The unemployment percentage is calculated by dividing the number of unemployed respondents by the number of respondents in the labor force.

[d] Respondents who were not working (either full or part time) and who did not fall into the unemployed category were assumed to be NILF. The NILF percentage is calculated by dividing the number of respondents not in the labor force by the total number of respondents.

[e] Because so few respondents indicated a pay grade of O7–O10, their data are not reported so as not to risk their being identifiable.

[f] Type of injury is self-reported by respondents in response to a close-ended survey item asking them to "please indicate any physical or mental injuries or health problems you experienced while serving in the military after September 11, 2001."

Selection of Analyses

The WWP 2013 Alumni Survey data set is a rich one, and analyzing all data was not feasible for this project. Instead, a set of analyses was strategically selected through conversations with WWP staff. Specifically, the analyses contained in this report are supplied in direct response to requests from two groups of staff within WWP—the Physical Health and Wellness Program staff and the Policy and Government Affairs team.

Statistical Techniques

To understand how WWP alumni are faring on different outcome measures, regression analyses were conducted. Regression analysis techniques allow for the exploration of relationships among many different variables. In all regression analyses, respondent characteristics (e.g., age, gender, and military pay grade) serve as explanatory variables that can explain variation in outcome measures. For example, if the branch of service (e.g., Army) is used as an explanatory variable when looking at health status, the results can provide information about how branch of service and health status are related in the sample of WWP alumni.

The set of explanatory variables used in analyses described throughout this report are presented in Table 2.2. For some analyses, additional explanatory variables beyond those in Table 2.2 are used, and these are noted where relevant. For all analyses, weights were applied. This means that results were adjusted so that they are representative of the entire population of WWP alumni, not just those sampled. For more details on the calculation of weights, see the Westat report (Franklin et al., 2013).

Table 2.2
Explanatory Variables Used in Regression Analyses

Variable	Levels of Variable
Gender	Male, female
Age	18–25, 26–30, 31–35, 36–40, 41–45, 46–50, 51–55, 56+
Race/ethnicity	White, Black or African-American, Hispanic or Latino, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, other, multiple races/ethnicities selected
Marital status	Married, previously married, never married
Branch of service[a]	Army, Navy/Coast Guard, Marine Corps, Air Force, served in multiple branches
Service component (at time of survey)	Active component, activated National Guard or Reserve, National Guard or Reserve (not activated), not in the military (i.e., neither active component nor National Guard or Reserve)
Highest pay grade[b]	E1–E4, E5–E9, W1–W5, O1–O3, O4–O6 (O7 and up omitted)
VA disability rating (%)	0, 10–20, 30–40, 50–60, 70–80, 90–100, pending/appeal, no rating
Injury type (self-reported)	Amputation; anxiety; blind or severe visual loss; burns (severe); depression; PTSD; severe back, neck, or shoulder problems; severe hearing loss; severe knee injuries or problems; spinal cord injury; TBI; tinnitus; other severe physical injuries; other severe mental injuries; no physical or mental health injuries or health problems
Probable depression	Positive screening for probable depression; no positive screening for probable depression
Probable PTSD	Positive screening for probable PTSD; no positive screening for probable PTSD
Probable problem drinking	Positive screening for probable problem drinking; no positive screening for probable problem drinking

NOTE: All injury-type variables are self-reported by survey respondents in response to the item asking them to "please indicate any physical or mental injuries or health problems you experienced while serving in the military after September 11, 2001."

[a] Because during wartime the Coast Guard falls under the Department of the Navy, respondents who reported serving in the Navy or Coast Guard are combined into one category for analysis.

[b] Because the number of Wounded Warriors with pay grades of O7 and up is small, this group is omitted from analyses to eliminate any risk of their being identifiable.

CHAPTER THREE

Mental Health Outcomes

WWP's strategic objective 1 is to *ensure that Wounded Warriors are well adjusted in mind and spirit*. To help WWP understand the needs of their alumni, data on the mental health challenges alumni face, along with their reported difficulty in getting mental health care, are reported in this chapter. Technical Appendix B contains details of the regression analysis reported in this chapter.

At Least Half of Alumni Report Mental Health Symptoms and Problems

The 2013 WWP Alumni survey contained measures that allow respondents to be screened for probable depression, PTSD, and problematic alcohol consumption. These screening measures assess the degree to which respondents reported having symptoms of mental health conditions and provide some indication of the number of respondents who might be experiencing a mental health condition. Screening measures that correctly identify people who meet diagnostic criteria for mental health conditions in all cases are not available. As a result, when using any screening instrument, there is a trade-off between correctly identifying all individuals who have the disorder (sensitivity) and correctly identifying those who do not have the disorder (specificity) (Ramchand et al., 2008; Prins et al., 2003; Lalkhen and McCluskey, 2008). Consequently, screening positive does not indicate that a person would meet the criteria for a formal diagnosis of a mental health condition, which would require a thorough assessment by a mental health professional. Rather, a positive screen indicates that a person is having symptoms of a mental health disorder and likely has a greater probability of having the disorder than someone who did not screen positive. Because large-scale surveys preclude the option of having a mental health professional assess each respondent for mental health conditions, screening measures are commonly used to identify the prevalence of disorders by identifying the number of people who screened positive. The three screening measures included in this study and described below have been psychometrically tested and validated and are widely used for assessing the prevalence of the relevant mental health disorder.

The eight-item Patient Health Questionnaire (PHQ-8) depression scale was included in the survey as a screening measure for probable depression (Kroenke et al., 2009). The PHQ-8 requires respondents to endorse the frequency with which they experience eight symptoms of depression (e.g., feeling down, depressed, or hopeless and feeling tired or having little energy), and in this study, respondents who met a threshold score of 10 were designated as screening positive for probable depression. Using a cutoff score of 10 or greater yields a sensitivity of 88 percent (Kroenke et al., 2009), indicating that, typically, 88 percent of individuals who com-

plete the PHQ-8 and meet criteria for a formal diagnosis of depression are correctly identified as having probable depression. This means that 12 percent of individuals who would meet diagnostic criteria for depression would go undetected. The specificity of the PHQ-8 measure is also 88 percent (Kroenke et al., 2009), indicating that, typically, 88 percent of the individuals who complete the instrument and do not meet criteria for a depression diagnosis are correctly identified as not having depression. This means that 12 percent of individuals who do not meet diagnostic criteria would be incorrectly identified as having probable depression.

The Primary Care PTSD Screen (PC-PTSD) serves as a screening measure for probable PTSD. The PC-PTSD requires respondents to report whether they have experienced four PTSD symptoms (e.g., nightmares, feeling on guard or watchful), and in this study, individuals who reported experiencing three of the symptoms were considered to have screened positive for PTSD (Prins et al., 2003). Using a cutoff of at least three symptoms reported yields a sensitivity of 78 percent and a specificity of 87 percent (Prins et al., 2003).

The alcohol consumption questions from the Alcohol Use Disorders Identification Test (AUDIT-C) serve as a screening measure for probable problem drinking. These questions ask respondents about the frequency and quantity of drinking, as well as heavy drinking episodes (Bush et al., 1998). In this study, men and women who met the threshold score for their sex (a score of 4 for men, and 3 for women) were considered probable problem drinkers. For men, the threshold score of 4 results in a sensitivity of 86 percent and a specificity of 89 percent (Bradley et al., 2007). For women, the threshold score of 3 yields a sensitivity of 73 percent and a specificity of 91 percent (Bradley et al., 2007).

Among WWP alumni, at least half screened positive for probable depression, PTSD, or problem drinking (see Table 3.1). These numbers are higher than the prevalence rates reported in other studies of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) veterans. The rates of PTSD and depression are both estimated at 14 percent for returning OEF and OIF veterans (Tanielian and Jaycox, 2008), and rates of problem drinking among OEF and OIF veterans utilizing VA health care are around 40 percent (Calhoun et al., 2008). Higher rates of probable mental health and substance-use disorders among WWP alumni are to be expected given that experiencing a physical or mental health condition coincident to military service is required to be an alumnus.

Table 3.1
Prevalence of Probable Depression, PTSD, and Problem Drinking Among 2013 WWP Alumni

Probable Mental Health Condition	Percentage of Total Sample Screening Positive
Probable depression (positive screen on PHQ-8)	59.6
Probable PTSD (positive screen on PC-PTSD)	66.4
Probable problem drinking (positive screen on AUDIT-C)	51.7

NOTE: *N* = 13,956.

Alumni Report Challenges Accessing Mental Health Care and Seeking Help

The prevalence of probable depression, PTSD, and problem drinking among WWP alumni may signal an accompanying need for mental health care. However, 37 to 47 percent of the WWP alumni who screened positive for probable depression, PTSD, or problem drinking also responded yes to the following question: "During the past 12 months were there any times when you had difficulty getting mental health care, or you put off getting care or you did not get the mental health care you thought you needed?" See Table 3.2.

Respondents who endorsed having difficulty getting, putting off getting, or not getting mental health care were asked why they did not get care. Alumni who screened positive for probable depression, PTSD, or problem drinking all endorsed similar reasons (see Table 3.3). Notably, more than 40 percent of the alumni who screened positive for probable depression, PTSD, or problem drinking endorsed inconsistent treatment or lapses in treatment as a reason for difficulty in getting care, representing a practical barrier. Approximately 35 percent endorsed "other reasons," and it is unclear what these reasons are without doing a deep dive into open-ended responses (which is out of the scope of this project). About 33 percent of alumni who screened positive for a disorder indicated that they did not feel comfortable with existing resources within the Department of Defense (DoD) or VA. It is unclear whether this represents a practical barrier to care or if the reported feelings of discomfort represent stigma-related concerns. About 28 to 31 percent of alumni who screened positive reported concern related to jeopardizing their careers. Twenty-five to 27 percent of alumni who screened positive reported a stigma-related concern—being seen as weak—as a reason for not getting mental health care. The barriers reported by alumni echo findings on barriers to care among service members more generally, with service members citing practical, stigma-related, and career-related barriers to care (Hoge et al., 2004; Kim et al., 2011).

Reducing the barriers to getting mental health care likely requires a multipronged approach for addressing the variety of barriers reported. For example, to address the barriers of inconsistent treatment or treatment lapses, WWP could provide or bolster existing programs that focus on connecting alumni to care and promoting treatment adherence. Evidence suggests that education about mental health and treatment seeking and contact with people with mental health disorders can help reduce the stigma surrounding mental illness (Penn and Couture, 2002). Because many alumni endorse "other reasons" for difficulty with getting, delays

Table 3.2
Proportion of WWP Alumni Screening Positive for a Mental Health Condition Who Report Having Difficulty Getting, Putting Off Getting, or Not Getting Mental Health Care

Probable Mental Health Condition	Percentage of Total Sample Reporting Difficulties Getting, Delays with Getting, or Not Getting Mental Health Care
Probable depression (positive screen on PHQ-8)	46.9
Probable PTSD (positive screen on PC-PTSD)	43.6
Probable problem drinking (positive screen on AUDIT-C)	37.2

NOTE: *N* = 13,956.

Table 3.3
Top-Five Reported Barriers to Getting Mental Health Care

Reported Reason for Difficulty in Getting Care	Percentage of Those Screening Positive for Probable Depression Who Endorse Item	Percentage of Those Screening Positive for Probable PTSD Who Endorse Item	Percentage of Those Screening Positive for Probable Problem Drinking Who Endorse Item
1. You had inconsistent treatment or lapses in treatment (e.g., canceled appointments, had to switch providers)	43.8	42.5	40.8
2. Other reason(s)	35.3	35.5	34.9
3. You did not feel comfortable with existing resources within the DoD or VA	33.6	33.3	33.6
4. You were concerned that your future career plans would be jeopardized by seeking treatment	28.2	27.7	31.3
5. You felt that you would be considered weak for seeking mental health treatment	25.6	25.0	27.1

getting, or not getting care, probing further into these reasons may be an important step to understanding why getting needed mental health care is a challenge.

Alumni Reporting Mental Health Conditions: Female Alumni and Younger Alumni Report More Difficulties and Delays in Getting Care or Not Getting Care

A logistic regression analysis was conducted that explored the relationship between alumni characteristics, including type of injury and reported difficulty in getting care. This analysis is detailed in Technical Appendix B, and notable summary results are reported here. Alumni who reported having mental health conditions (i.e., those who self-reported having depression, PTSD, anxiety, or other mental injuries) were more likely to indicate that they had difficulty getting or had delayed getting care or did not get the care they needed relative to alumni without these conditions. Alumni who screened positive for probable depression or PTSD were 2.5 and 2.0 times more likely, respectively, to report difficulty getting, delays getting, or not getting care relative to those who did not screen for these problems. Respondents who screened positive for probable problem drinking were 1.3 times as likely to report difficulty getting, delays getting, or not getting care. Alumni who self-reported having anxiety or other mental health conditions were 1.3 and 1.4 times as likely as those without these injuries to report difficulty getting care. These findings may be due to these service members having had more exposure to the mental health system and thus more opportunities to observe or experience barriers to care.

Gender and age were also related to reports of care access. Female alumni were about 1.5 times more likely than male alumni to indicate that they had difficulty getting or delays in getting care or that they did not get the care they needed. Also, alumni ages 41 and up were less

likely to report difficulty getting, delays getting, or not getting needed care relative to alumni between the ages of 26 and 30.

Summary

WWP alumni screened positively for probable depression, PTSD, and problem drinking at rates greater than 50 percent. Because one criterion for being an alumni is having experienced a service-connected physical or mental health condition, it is not surprising that these rates are higher than for OEF and OIF veterans in general (Tanielian and Jaycox, 2008; Calhoun et al., 2008). Of the alumni screening positive, 37 percent to 47 percent reported having difficulty accessing mental health care, delaying it, or not getting the care they need. They attribute these care-access challenges to a variety of reasons, including practical barriers (e.g., canceled appointments), concerns about effects on their careers, and stigma-related concerns (e.g., being considered weak). Alumni who reported mental health conditions also reported more difficulty getting, delays getting, or not getting care relative to alumni without mental health conditions. In addition, female alumni reported greater difficulties and delays than male alumni, and younger alumni reported more difficulties and delays than older alumni.

CHAPTER FOUR

Physical Health Outcomes

WWP's strategic objective 2 is to *ensure that Wounded Warriors are well adjusted in body*. To help WWP understand the physical health of their alumni, data on the body mass index (BMI) of alumni and the relationship of BMI to other physical health outcomes are reported in this chapter. Technical Appendix C contains details of regression analyses reported in this chapter.

Achieving a Healthy BMI Is a Challenge for Over 80 Percent of Alumni

BMI is an indicator of being overweight or obese, and it was calculated for each respondent based on self-reported height and weight.[1] Obesity is linked with many negative health outcomes, including heart disease, cancers, and other chronic health problems (Centers for Disease Control and Prevention, 2012a), and as such, it is of concern to WWP and to the nation more broadly. Standard labels designate a BMI less than 18.5 as underweight, 18.5 to 24.9 as normal weight, 25.0 to 29.9 as overweight, and 30.0 or higher as obese (Centers for Disease Control and Prevention, 2012b).

WWP alumni have an average BMI of 29.4 (with a standard deviation [SD] of 5.0), indicating that, on average, WWP alumni are at the high end of the overweight category. Table 4.1 indicates the proportions of WWP alumni who fall into each BMI category. About 42 percent of alumni are overweight, and 41 percent are obese. This rate of obesity is higher than the estimate of 35.7 percent for the general U.S. adult population (Ogden et al., 2012).

Table 4.1
Prevalence of Normal Weight, Overweight, and Obese WWP Alumni

BMI Category	Percentage of WWP Alumni
Underweight (BMI less than 18.5)	0.4
Normal weight (BMI 18.5–24.9)	16.5
Overweight (BMI 25.0–29.9)	41.9
Obese (BMI 30.0 or greater)	40.8

[1] Standard BMI calculations are not accurate for people who have undergone amputation. Although it is possible to adjust BMI for people with amputation (Tzamaloukas, Patron, and Malhotra, 1994), the calculations require knowledge of the nature of the amputation, which was not available in the 2013 WWP Alumni Survey data set. Thus, calculations utilize the standard BMI calculation for amputees, with an acknowledgment that the interpretation of results for this group is limited.

BMI Is Related to Other Physical Health Outcomes and Perceptions

This section includes an exploration of the relationship of BMI to other physical health outcomes assessed in the 2013 WWP Alumni Survey. Shedding light on these relationships may help guide programs or intervention strategies to improve the quality of life on WWP alumni. However, it cannot be determined whether being overweight causes changes in physical health outcomes or vice versa, or whether a third factor could influence both BMI and other physical health outcomes, as the 2013 WWP Alumni Survey data is cross-sectional.

The 2013 WWP Alumni Survey contains measures of general self-reported health, physical functioning, and exercise frequency. Measuring general self-reported health status requires respondents to reply to a question asking, "In general, would you say your health is . . ." and then selecting one of the following response options: excellent, very good, good, fair, or poor (McHorney et al., 1994; McHorney, Ware, and Raczek, 1993; Ware and Sherbourne, 1992). Physical functioning is determined by using the physical role functioning measure from the RAND 36-Item Short Form Health Survey (SF-36) (Hays, Sherbourne, and Mazel, 1993), and then averaging responses (either 0 for yes or 100 for no) to four questions about the extent to which physical health has interfered with work or activities (e.g., "cut down the amount of time you spent on work or other activities?"). So, lower scores indicate greater limitations due to physical health and higher scores indicate fewer limitations due to physical health. Exercise frequency is measured with a single item asking, "In a typical week, how many days do you do any moderate-intensity physical activity or exercise, such as a brisk walk, jog, cycle, play adapted sports, swim . . .?" There are several response options for this question: less than once a week, one day a week, two days a week, and through to seven days a week. Respondents were also asked to select which barriers made it difficult for them to exercise, do sports, or otherwise engage in physical activity.

Alumni with Obesity Are More Likely to Report Being in Fair or Poor Health

Table 4.2 indicates that WWP alumni who are obese reported being in fair or poor health more so than those were overweight. This is supported by a logistic regression analysis showing a significant relationship between BMI and general self-reported health, such that having a higher BMI is associated with a greater likelihood of reporting fair or poor health (see Technical Appendix C.1). The logistic regression analysis also showed effects of several respondent characteristics on the likelihood of reporting fair or poor health. Alumni who identified as Hispanic or Latino or as Black or African-American were 1.3 and 1.6 times more likely, respectively, than White alumni to report fair or poor health; Asian alumni were 2.2 times more likely than White alumni to report fair or poor health. Alumni were more likely to report fair or poor health status the older they are or the greater their VA disability rating. Finally, alumni reporting having amputation or those with no injury were less likely to report fair or poor health than those without amputation or those who had an injury. Alumni with depression; spinal cord injury; TBI; severe back, neck, or shoulder problems; severe knee injuries or problems; other severe physical injuries; and other severe mental injuries were between 1.2 and 1.7 times more likely to report fair or poor health than those without the injury. Alumni who screened positive for probable depression were 3.0 times more likely to report fair or poor health than those who did not screen positive.

Table 4.2
BMI and Physical Health Outcomes

BMI	Percentage Reporting Generally Fair or Poor Health Status	Mean Physical Functioning Score[a] (SD)	Mean Number of Days Exercising per Week (SD)
Healthy weight (BMI 18.5–24.9)	43.5	39.7 (12.7)	2.6 (2.2)
Overweight (BMI 25.0–29.9)	46.7	39.6 (13.0)	2.5 (2.1)
Obese (BMI 30.0 or greater)	61.0	37.3 (12.6)	1.7 (2.0)
Total sample	51.9	38.7 (12.9)	2.2 (2.1)

[a] The physical functioning score combines several questions about daily limitations due to physical health. *Lower* scores indicate *greater* problems working or engaging in daily activities as a result of physical health, and *higher* scores indicate *fewer* problems with work and daily activities due to physical health.

Alumni with Obesity Are More Likely to Report Being Limited Due to Their Health

Obese alumni also reported the greatest limitations due to their physical health, and this is supported by a multiple regression analysis (see Technical Appendix C.2) showing that higher BMI is associated with slightly poorer physical functioning. There is some statistically significant variation in physical limitations scores based on respondent characteristics. However, the magnitude of the variation is very small given the range of possible scores on the measure, suggesting that respondent characteristics are not meaningfully associated with different levels of limitations of daily activities due to physical health.

Alumni with Obesity Exercise Less Than Overweight or Healthy Weight Peers

Obese alumni reported exercising the fewest number of days per week (less than two days a week) relative to their overweight and healthy-weight peers. This is supported by a multiple regression analysis (see Technical Appendix C.3) showing that higher BMI is associated with exercising slightly fewer days per week. This analysis also showed some statistically significant variation in exercise frequency based on individual characteristics, although often these variations were small in magnitude (less than a 0.5 change on the scale of exercising zero to seven days per week). Alumni who screened positive for probable depression exercise 0.8 days less per week relative to alumni who did not screen positive. Alumni who reached pay grades of O1 to O6 reported exercising between 0.5 and 0.6 days more per week relative to junior enlisted personnel. Active-component alumni exercise 0.8 more days per week relative to alumni who are out of the military. Exercise frequency decreased for alumni in each age group.

On Average, Alumni Exercise Less Than Three Days Per Week

In general, WWP alumni are exercising a little more than two days per week. To better understand the reasons why levels of engagement in exercise and physical activity are fairly low, barriers to exercise and physical activity were examined and are reported in Table 4.3. In general, a greater percentage of WWP alumni who are obese endorse barriers relative to alumni who are overweight or normal weight. The top barriers are similar for alumni of all BMIs, and include discomfort with social situations, concerns about safety or reinjury, finding time to train or participate in physical activity, and finding the financial resources to support playing sports. About 17 percent of healthy weight and 18 percent of overweight alumni reported having no obstacles to physical activity, and only 10 percent of obese alumni reported no obstacles.

Table 4.3
Top Reported Barriers to Exercise, Sports, or Physical Activity

Reason for Difficulty in Engaging in Exercising, Playing Sports, or Engaging in Other Physical Activities	Percentage of Normal Weight Alumni Endorsing	Percentage of Overweight Alumni Endorsing	Percentage of Obese Alumni Endorsing
1. Uncomfortable in social situations	36.0	34.1	42.3
2. Concerns related to safety or reinjuring myself	33.2	34.9	40.1
3. Finding time to train and participate in physical activity	29.5	33.6	35.8
4. Other obstacles or barriers	22.2	19.8	24.9
5. Finding the financial resources to support playing sports	16.7	16.2	20.2
6. Physician restricted me from participating	15.8	16.4	17.5

Mental and Physical Injuries Are Both Related to Perceptions of Health

Like BMI, mental health is also related to how people perceive their overall physical health. Research shows that mental and physical health are interdependent and interrelated (Substance Abuse and Mental Health Services Administration, 2012; Hays et al., 1994). That is, physical health can influence mental health and vice versa.

As shown in Table 2.1, WWP Alumni Survey respondents reported a range of service-related injuries. These injuries vary in whether they are physical or mental health related. Exploring the relationship between the type of injury reported by alumni and physical health outcomes can reveal differential relationships of physical and mental health on physical health outcomes, such as self-reported health status, exercise frequency, and limitations resulting from physical health.

The percentages of WWP alumni with different types of injuries reporting fair or poor health status are presented in Table 4.4. Of WWP alumni with amputations, 30 percent reported that their health is only fair or poor. Among WWP alumni with other types of injuries, percentages ranged from 50 percent to 73 percent. Although Table 4.4 indicates that many WWP alumni feel that they are in fair or poor health, the regression analysis reported in the previous chapter and in Technical Appendix C.1 provides more insight into which types of injuries are associated with a greater likelihood of reporting fair or poor health (relative to the number of respondents without those types of injuries who reported being in fair or poor health). Alumni who reported having depression; spinal cord injury; TBI; severe back, neck, or shoulder problems; severe knee injuries or problems; other severe physical injuries; and other severe mental injuries were between 1.2 and 1.7 times more likely to report fair or poor health relative to alumni without those types of injuries. Alumni who screened positive for probable depression were 3.0 times more likely to report fair or poor health than those who did not screen positive. Alumni with amputation and who reported having PTSD were the only respondents who were *less* likely to report fair or poor health status relative to alumni without those conditions. These analyses indicate that WWP alumni's judgments of their general health status are likely based on both their mental and physical health, given that both physical and mental injuries are associated with fair or poor health status.

Table 4.4
Injury Type and General Self-Reported Health Status

Injury Type	Percentage Reporting Fair or Poor Health Status
Amputation	29.6
Anxiety	58.3
Blind or severe visual loss	59.7
Burns (severe)	50.3
Depression	61.1
PTSD	57.7
Severe back, neck, or shoulder problems	62.3
Severe hearing loss	60.4
Severe knee injuries or problems	60.9
Spinal cord injury	69.7
TBI	60.0
Tinnitus	57.7
Other severe physical injuries	57.3
Other severe mental injuries	73.1
No injury reported	8.7
Total sample	51.9

The mean exercise frequencies for WWP alumni with different types of injuries are presented in Table 4.5. WWP alumni with amputation, blindness or severe visual loss, or severe burns reported exercising the greatest number of days per week, ranging from 2.2 to 2.7 days per week. WWP alumni with other injury types exercised less frequently, and some of the alumni who exercised least frequently, at about two days per week or less, were those with anxiety; depression; PTSD; spinal cord injury; tinnitus; severe back, neck, or shoulder problems; severe knee injuries or problems; and those with other mental injuries. In a regression analysis reported in the previous chapter and in Technical Appendix C.3, alumni reporting depression or severe back, neck, or shoulder problems reported exercising 0.3 and 0.2 days per week less than those without those conditions. Alumni who screened positive for probable depression exercised 0.8 days less than those who did not screen positive. Some other differences were statistically significant, but were only indicative of changes of 0.20 or less on the scale of zero to seven days of exercise in a week. These analyses indicate that it is not only physical injuries that can impair alumni ability to engage in exercises. Depression, a mental health condition, was also associated with a reduction in exercise frequency (relative to those who did not report having depression).

The percentages of respondents who reported being limited "a lot" in performing "vigorous activities, such as running, lifting heavy objects, participating in strenuous sports," presented by type of injury reported, are presented in Table 4.6. Rates vary from about 55 percent to nearly 79 percent. Almost 79 percent of alumni with spinal cord injury and more than 55

Table 4.5
Injury Type and Exercise Frequency

Injury Type	Mean Number of Days Exercised per Week (SD)
Amputation	2.7 (2.1)
Anxiety	2.0 (2.1)
Blind or severe visual loss	2.2 (2.1)
Burns (severe)	2.5 (2.1)
Depression	1.9 (2.0)
PTSD	2.0 (2.1)
Severe back, neck, or shoulder problems	1.9 (2.1)
Severe hearing loss	2.1 (2.2)
Severe knee injuries or problems	2.0 (2.1)
Spinal cord injury	1.8 (2.1)
TBI	2.1 (2.1)
Tinnitus	2.0 (2.1)
Other severe physical injuries	2.1 (2.1)
Other severe mental injuries	2.0 (2.1)
No injury reported	3.3 (1.9)
Total sample	2.2 (2.1)

percent of alumni with other injuries and conditions reported limitations. Roughly 58 percent of alumni with mental health conditions (e.g., anxiety, depression, or PTSD) endorse being limited a lot. In a regression analysis reported in Technical Appendix C.4, alumni with amputation; spinal cord injury; severe back, neck, or shoulder problems; severe knee injuries or problems; and other physical injuries reported greater limitations than those without those injuries. Alumni who screened positive for probable depression were more likely to report being limited than alumni who did not screen positive. These analyses indicate that limitations in performing physical activity are reported not just by those with physical injuries but also by those with mental health conditions.

Alcohol Use Is Related to General Self-Reported Health in an Unexpected Way

The prevalence of alcohol use and its relationship to difficulty in accessing mental health care were discussed in Chapter 3. Here we explore the relationship between problem drinking and general self-reported health status.

Table 4.7 depicts the percentage of WWP alumni who reported having fair or poor health status, broken down by alcohol consumption patterns. Alcohol consumption categories include nondrinkers who reported never consuming alcohol, alumni who drink but did not

Table 4.6
Injury Type and Limitations in Performing Vigorous Activity

Injury Type	Percentage Reporting Being Limited "a Lot" in Vigorous Activities
Amputation	54.5
Anxiety	58.2
Blind or severe visual loss	59.4
Burns (severe)	57.4
Depression	59.3
PTSD	56.8
Severe back, neck, or shoulder problems	66.3
Severe hearing loss	59.3
Severe knee injuries or problems	65.0
Spinal cord injury	78.8
TBI	59.8
Tinnitus	58.1
Other severe physical injuries	59.0
Other severe mental injuries	58.4
No injury reported	10.4
Total sample	54.2

screen positive for probable problem drinking on the AUDIT-C (see Chapter 3), and alumni who have screened positive for probable problem drinking. Surprisingly, those who do not drink were the group most likely to indicate fair or poor health status, followed by those who are nonproblem drinkers, and finally, potential problem drinkers. This is supported by the logistic regression analysis described in Technical Appendix C.1 in which alumni who did not consume alcohol were 1.4 times more likely to report fair or poor health than alumni who screened positive for probable problem drinking. Nonproblem drinkers were 1.1 times more likely to report fair or poor health than those who screened positive for probable problem drinking. This result is counterintuitive, and it is unclear exactly why in this sample individuals who screened positive for probable problem drinking have better self-reported health status than nondrinkers.

Summary

In summary, upward of 80 percent of WWP alumni have BMIs putting them in the overweight or obese category. Obese alumni were more likely to report their general health status as being fair or poor, and they experience greater limitations to their daily activities and work due

Table 4.7
Alcohol Use and General Self-Reported Health Status

Drinking Status (*n*)	Percentage Indicating General Fair or Poor Health Status
Nondrinkers (3,119)	62.2
Nonproblem drinkers (those with AUDIT-C scores below threshold) (3,391)	51.5
Potential problem drinkers (those with AUDIT-C scores above threshold) (6,979)	47.7
Total sample (13,916)	51.9

to their physical health than do the alumni who are overweight and of normal weight. Obese alumni also exercise least frequently compared to the other groups.

In general, WWP alumni exercise a little more than two days per week (on average). Regardless of BMI, the most frequently endorsed barriers to exercise and physical activity are discomfort in social situations, concerns about safety and reinjury, and finding time to train and participate. Obese WWP alumni endorse these barriers at greater rates than overweight and healthy weight alumni.

Survey results also made clear the interrelated nature of mental and physical health. Although many types of physical injuries were linked to alumni reports of poor health, reduced exercise frequency, and feeling limited in engaging in vigorous physical activity, alumni reporting mental health conditions also felt in poor health and that they were limited in their ability to perform physical activity. However, in the case of alcohol use, those who do not consume alcohol were more likely to indicate fair or poor health status than alumni who screened positive for probable problem drinking.

CHAPTER FIVE

Economic Outcomes

WWP's strategic objective 3 is to *ensure that Wounded Warriors are economically empowered*. This chapter focuses on the relationship between injury type and education and employment outcomes of the WWP alumni. Technical Appendix D contains details of the regression analyses reported in this chapter.

Half of Alumni Are Employed

Forty-five percent of alumni are employed full time and 7 percent are employed part time. Thirty-six percent of alumni are out of the labor force (i.e., unemployed or not looking for work). The rate of unemployment among WWP alumni who are in the labor pool (who are either working or indicated that they looked for work in the past four weeks and would have accepted a job offer if they received one or would have done so except for a temporary illness), 17.8 percent, is considerably higher than a August 2013 estimate of 10 percent for post-9/11 veterans (Levardi, 2013) and the peak unemployment moving average rate of 13.9 percent among recent veterans (post-2003) who are in the labor force (Faberman and Foster, 2013).

Few Alumni Access Employment and Education Benefits

Numerous programs and benefits are available to aid service members and veterans in empowering themselves in terms of education and employment. Two examples of these programs are the VA Vocational Rehabilitation and Employment Program (VR&E) and the Post-9/11 GI Bill (otherwise known as the New GI Bill). VR&E is a congressionally authorized program that "assists veterans with service-connected disabilities to prepare for, find, and keep suitable jobs" and helps veterans with severe disabilities by offering "services to improve their ability to live as independently as possible" ("Vocational Rehabilitation and Employment," no date). To be eligible for VR&E, service members or veterans must have received or expect to receive an other-than-dishonorable discharge. Active duty service members must obtain a memorandum of rating of 20 percent or greater from the VA, and veterans must have a VA rating of 10 percent or greater ("Vocational Rehabilitation and Employment: Eligibility and Entitlement," no date). To approximate these eligibility criteria using the data available, we conducted our analyses using the 67 percent of the total sample with a VA rating of 10 percent or greater. Only 8.7 percent of this subsample reported that they are using VR&E benefits.

The Post-9/11 GI Bill "provides financial support for education and housing to individuals with at least 90 days of aggregate service after September 10, 2001, or individuals discharged with a service-connected disability after 30 days" ("The Post-9/11 GI Bill," 2013). Because these eligibility criteria are broad, we conducted our analyses using the full sample. Of the full sample, 17 percent reported using Post-9/11 GI Bill benefits.

Population characteristics of WWP alumni that influence the use of VR&E and Post-9/11 GI Bill benefits are detailed in Technical Appendix D.1 and D.2.

Type of Injury Is Related to Participation in Employment and Education Benefit Programs

Type of injury is related to the use of these VR&E and Post-9/11 GI Bill benefits. Alumni who reported amputation, TBI, or severe knee injuries or problems were 1.6, 1.3, and 1.2 times more likely to use VR&E benefits than those who did not report these injury types, respectively. Alumni reporting most types of injuries were not differentially likely to use Post-9/11 GI Bill, with the exception of alumni with amputation or who screened positive for probable depression. These alumni were less likely to use their Post-9/11 GI Bill benefits than those who did not report having amputation or who did not screen positive for depression.

High VA Disability Ratings and Many Injury Types Are Associated with Unemployment

Because VA disability ratings are determined in part by the degree of occupational impairment that an individual experiences due to his or her disability and are intended to reflect ability to work, VA disability ratings should be related to employment outcomes in this sample. As expected, higher VA ratings were associated with a greater likelihood of not being in the labor force (i.e., neither working nor looking for work) (see Technical Appendix D.3). To be more specific, alumni with VA ratings of 50 percent to 60 percent were 1.63 times more likely to be out of the labor force than alumni with ratings of 10 percent to 20 percent. Alumni with ratings of 70 percent to 80 percent were 2.74 times more likely. The most-severely disabled alumni, with ratings of 90 percent to 100 percent, were 8.0 times more likely to be out of the labor force than those with ratings of 10 percent to 20 percent. Other alumni characteristics associated with being out of the labor pool are found in Technical Appendix D.3.

We next wanted to explore employment among alumni who are in the labor force (i.e., who are working or looking for work). Using only the subsample of respondents in the labor force, a logistic regression analysis was conducted to explore relationships among alumni characteristics and the likelihood of being employed full or part time (see Technical Appendix D.4). Alumni with VA disability ratings of 70 percent or greater or whose ratings are pending were significantly less likely to be employed full time or part time than alumni with ratings of 10 percent to 20 percent. Alumni who had an amputation were 1.6 times more likely to be employed than those without one. However, alumni who reported other injury types—specifically, depression; spinal cord injury; severe back, neck, or shoulder problems; severe knee injuries or problems; or other mental injuries—were less likely to be employed than alumni without those injuries. An association between injury types and employment status is appropriate

given that the WWP alumni population is by definition one that includes service members and veterans with varying levels of disabilities that may affect their capacity to work. And again, because VA disability ratings are intended to reflect ability to work, the relationship between VA ratings and employment is expected. However, because the analysis was restricted to those who are in the labor force, the finding that alumni with VA disability ratings of 70 percent or greater or whose rating is pending were less likely to be employed than those with lower VA ratings may signal that these alumni may be in need of more assistance or services aimed to help them find employment.

Summary

About 52 percent of WWP alumni are employed either full or part time. Of the remaining alumni who are not working, 17.8 percent are unemployed and looking for work. Despite many alumni being unemployed or having the possibility of obtaining higher levels of education, overall, there is low alumni participation in veteran-specific employment and education programs. Only 8.7 percent of WWP alumni reported that they are using the VA VR&E, and only 17 percent reported using the Post-9/11 GI Bill.

Finally, employment outcomes are strongly associated with VA disability ratings. Alumni with VA disability ratings of 70 percent or greater or whose ratings are pending were significantly less likely to be employed full time or part time than alumni with ratings of 10 percent to 20 percent. Higher VA disability ratings were associated with a greater likelihood of being out of the labor force. For example, alumni with ratings of 70 percent to 80 percent were 2.7 times more likely to be out of the labor force than those with ratings of 10 percent to 20 percent. Similarly, alumni with ratings of 90 percent to 100 percent were 8.0 times more likely to be out of the labor force than alumni with ratings of 10 percent to 20 percent.

CHAPTER SIX

Discussion

The statistical analyses described in this report drew upon WWP 2013 Alumni Survey results, and the results were weighted to represent all 2013 alumni. Our analysis explored the mental, physical, and financial well-being of current WWP alumni. Our results indicate that many, if not most, WWP alumni face substantial challenges in all three areas, and we hope that this report provides WWP with information helpful for setting priorities and making decisions about program efforts and policies. We now offer several issues for further consideration by WWP.

Empowering Wounded Warriors in Mind and Spirit

Our results indicate that many WWP alumni face difficult mental health challenges, including depression, PTSD, and potential alcohol abuse. At the same time, many of these alumni reported difficulty or delays in getting care. These difficulties and delays are attributed to a variety of factors, and WWP may wish to consider what interventions, programs, and strategies could reduce and eliminate these barriers to care. WWP may also wish to explore more deeply the "other reasons" that survey respondents selected as barriers to care to get a better sense of what stands in the way of obtaining mental health care. Furthermore, female alumni reported having more difficulty getting care than male alumni, and younger alumni reported more difficulty than older alumni. These findings may warrant an exploration of whether barriers to care differ for female versus male alumni and for younger versus older alumni.

Empowering Wounded Warriors in Body

High BMIs are clearly a health challenge facing WWP alumni. Because rates of being overweight and obese are high among alumni and because of known health risks associated with obesity, WWP may wish to critically consider evidence-based strategies for promoting weight loss among their alumni. One potential avenue into selecting strategies is to consider the barriers to exercise and physical activity most commonly reported by alumni—discomfort with social situations, concerns about safety and reinjury, and having time to train or participate in physical activity.

Also, the way in which BMI was measured in this study makes it difficult to draw conclusions about alumni with amputations. Efforts to understand the prevalence of obesity among this population may be warranted. Once it is determined whether high BMIs are problematic

among this subgroup of alumni, steps can be taken to determine best strategies for promoting weight loss.

Empowering Wounded Warriors Economically

Resources are available to help Wounded Warriors seek education and employment to promote their economic well-being. Many WWP alumni are eligible for benefit programs such as VR&E and the Post-9/11 GI Bill, but relatively few are taking advantage of these opportunities. WWP may wish to consider the reasons for this and give thought to the role the organization might play in promoting the uptake of these benefits among its alumni. To promote education and employment where possible, further research may be necessary to understand the reasons for not participating in such programs in order to design effective programs or intervention strategies targeting the issue.

Additionally, among WWP alumni in the labor force, alumni with VA ratings of 70 percent or greater or whose ratings are pending were less likely to be employed than alumni with lower VA ratings. WWP may want to further explore the barriers to employment faced by severely disabled alumni to determine how best to allocate resources to promote employment among this group.

TECHNICAL APPENDIX A

Interpretation of Regression Analyses

This appendix contains information about how to interpret the multiple regression and logistic regression analyses in the following technical appendixes. Multiple regression analyses illustrate a correlation between explanatory variables and the outcome variables of interest. When reporting the results of regression analysis, tables are presented that contain some indicator of the strength of the correlation. We describe in detail when we use two different types of regression—ordinary least squares (OLS) multiple regression and logistic regression—and how to interpret the resulting regression tables.

Multiple Regression

OLS regression (referred to throughout this report as multiple regression) is used when the outcome variable of interest is continuous (e.g., body mass index [BMI], which can take any value in a range of about 15 to 40, with greater numbers indicating obesity). The results of a multiple regression analysis take the form of a table showing regression coefficients for each explanatory variable used in the analysis. These coefficients can be interpreted as the incremental change in the outcome under analysis for every unit change in the explanatory variable, holding constant all other explanatory variables in the model. For example, consider a simple (and fictitious) analysis exploring the relationship between highest pay grade achieved (the explanatory variable) and BMI (the outcome variable). If the coefficient for the variable indicating that an alumnus achieved a highest rank of E5–E9 is 4, that implies that those who achieve ranks of E5–E9 have a BMI that is 4 units higher, on average, than those with a rank of E1–E4 (the reference group designated for this variable; see the discussion of explanatory variables below), holding all other explanatory variables constant. This higher coefficient would indicate that those with ranks of E5–E9 are more overweight than those with ranks of E1–E4.

Logistic Regression

Logistic regression is used when the outcome variable of interest is dichotomous (i.e., when the variable takes on one of two values). An example of a dichotomous variable is self-reported health status. For this variable, it is typical to code responses of "fair" or "poor" with one numeric value (e.g., 1) and responses of "excellent," "very good," or "good" as another (e.g., 0). For logistic regression results, tables contain odds ratios, which can be interpreted as the odds that an outcome will occur given a particular characteristic, compared with the odds of

the outcome occurring in the absence of that characteristic. For example, consider a simple (and, again, fictitious) analysis exploring the relationship between highest pay grade achieved (the explanatory variable) and self-reported health status (the outcome variable, coded as a 0 for good health and 1 for poor health as described above). An odds ratio greater than 1 would indicate that respondents of ranks E5–E9 would be more likely to be in poor health than those of ranks E1–E4. An odds ratio less than 1 would indicate that respondents of ranks E5–E9 would be less likely to be in poor health than those of ranks E1–E4.

Explanatory Variables

As explained in Chapter 2, a number of explanatory variables were included in analyses, and the standard set of explanatory variables entered simultaneously in all analyses appears in Table A.1. For most of the variables listed in the table, one level is designated as the "reference group," and this group appears in bold. Because injury types are not mutually exclusive (i.e., respondents could indicate multiple injury types), each injury serves as an independent explanatory variable. Thus, the reference group for a given injury would be the set of respondents who did not report that injury.

When a statistically significant regression coefficient or odds ratio results from an analysis, this can be interpreted as the relative change for one level of the explanatory variable relative to the reference group for the explanatory variable. In the regression tables in the appendixes that follow, the reference groups are included in the tables for ease of interpretation. They appear next to variable headings and are listed as omitted—e.g., "gender (Male omitted)." For a concrete example, see the one given in the "Multiple Regression" section above.

Statistical Significance

Although coefficients and odds ratios are generated for all explanatory variables used in a multiple or logistic regression analysis, respectively, this report focuses on the interpretation of explanatory variables that yield coefficients or odds ratio that are statistically significant at the $p < .05$ level, as is conventional in most social science research.

Weighting

Because survey respondents were selected from a database of all Wounded Warrior Project (WWP) alumni, sufficient information was available to weight survey data. This means that results can be adjusted so that they are generalizable to the broader WWP alumni population, not just those respondents who were invited to participate in the survey and who chose to complete it. Details on the calculation of weights can be found in the Westat report (Franklin et al., 2013). Results provided in the main text of this report and in these technical appendixes have been weighted.

Table A.1
Explanatory Variables Used in Regression Analyses

Variable	Levels of Variable (Reference Group in Bold)
Gender	**Male**, female
Age	18–25, **26–30**, 31–35, 36–40, 41–45, 46–50, 51–55, 56+
Race/ethnicity	**White**, Black or African-American, Hispanic or Latino, American Indian or Alaska Native, Asian, Native Hawaiian or other Pacific Islander, other, multiple races/ethnicities selected
Marital status	**Married**, previously married, never married
Branch of service[a]	**Army**, Navy/Coast Guard, Marine Corps, Air Force, multiple branches
Service component (at time of survey)	Active component, activated National Guard or Reserve, National Guard or Reserve (not activated), **out of the military**
Highest pay grade[b]	**E1–E4**, E5–E9, W1–W5, O1–O3, O4–O6 (O7 and up omitted)
VA disability rating (%)	0, **10–20**, 30–40, 50–60, 70–80, 90–100, pending/appeal, no rating
Injury type (self-reported)[c]	Amputation; anxiety; blind or severe visual loss; burns (severe); depression; posttraumatic stress disorder (PTSD); severe back, neck, or shoulder problems; severe hearing loss; severe knee injuries or problems; spinal cord injury; traumatic brain injury (TBI); tinnitus; other severe physical injuries; other severe mental injuries; no physical or mental health injuries or health problems
Probable depression	Positive screening for probable depression; **no positive screening for probable depression**
Probable PTSD	Positive screening for probable PTSD; **no positive screening for probable PTSD**
Probable problem drinking	Positive screening for probable problem drinking; **no positive screening for probable problem drinking**

NOTE: All variables are self-reported by survey respondents except for the probable depression, PTSD, and problem drinking variables, which are calculated based on responses to validated screening questions.

[a] Because during wartime the Coast Guard falls under the Department of the Navy, respondents who reported serving in the Navy or Coast Guard are combined into one category for analysis.

[b] Because the number of Wounded Warriors with pay grades of O7 and up is small, this group is omitted from analyses to eliminate any risk of their being identifiable.

[c] Because injury types are not mutually exclusive, the reference group for each type of injury is the set of respondents who did not report having that injury.

TECHNICAL APPENDIX B

Analyses for Chapter 3

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with alumni self-reports of difficulty getting, delays getting, or not getting mental health care. Variables used in the analysis are listed in Table B.1.

Table B.2 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- Female alumni were 46 percent more likely than male alumni to report difficulty getting, delays getting, or not getting mental health care.
- There are few differences in reported difficulty getting, delays getting, or not getting mental health care among racial and ethnic groups. Black or African-American alumni were less likely to report difficulty getting, delays getting, or not getting care, and alumni indicating that they are of more than one race were slightly more likely to report difficulty getting, delays getting, or not getting care.
- There are no differences based on marital status.
- From age 36 onward, alumni were less likely to report difficulty getting care (relative to the 26–30-year-old reference group).
- Alumni who served in the Navy were 21 percent more likely to report difficulty getting, delays getting, or not getting care relative to alumni who served in the Army. Alumni who served in the Marines were less likely to report difficulty getting, delays getting, or not getting care relative to alumni who served in the Army.

Table B.1
Variables Used in Logistic Regression of Having Difficulty Getting, Putting Off Getting, or Not Getting Mental Health Care on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey question: "During the *past 12 months*, were there any times when you had difficulty getting *mental health* care, or you put off getting care or you did not get the mental health care you thought you needed?" "Yes" response coded as a 1. "No" response coded as a 0.

- Active component and activated National Guard or Reserve respondents reported less difficulty getting, delays getting, or not getting care relative to those who are out of the military.
- There are no differences in difficulty based on pay grade or on Department of Veterans Affairs (VA) disability rating.
- Alumni who reported mental health conditions (i.e., depression, anxiety, PTSD, or "other mental health injuries") also reported significantly greater difficulty getting, delays getting, or not getting mental health care than alumni not reporting these conditions. Alumni who screened positive for probable depression or probable PTSD were 2.5 and 2.0 times more likely, respectively, to report difficulty getting, delays getting, or not getting care than those who did not screen positive for these conditions. Alumni who screened positive for probable problem drinking were 1.3 times more likely to report issues getting care than those who did not screen positive for probable problem drinking. Alumni reporting other types of injuries were no more or less likely to report difficulty getting, delays getting, or not getting mental health care.

Table B.2
Relationship Among Explanatory Variables and Reports of Difficulties Getting, Delays Getting, or Not Getting Mental Health Care

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	1.46
	[0.10]**
Race/ethnicity (White omitted)	
Black or African-American	0.75
	[0.07]**
Hispanic or Latino	0.92
	[0.06]
American Indian or Alaska Native	0.92
	[0.17]
Asian	0.91
	[0.15]
Native Hawaiian or other Pacific Islander	0.74
	[0.20]
Other	1.06
	[0.19]
More than one race/ethnicity category selected	1.18
	[0.10]*

Table B.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Marital status (married omitted)	
Never married	0.92
	[0.06]
Previously married	1.11
	[0.06]
Age (26–30 omitted)	
18–25	0.99
	[0.11]
31–35	0.91
	[0.06]
36–40	0.87
	[0.06]
41–45	0.74
	[0.06]**
46–50	0.74
	[0.07]**
51–55	0.62
	[0.08]**
56+	0.41
	[0.07]**
Branch of service (Army omitted)	
Navy/Coast Guard	1.21
	[0.10]*
Marines	0.88
	[0.05]*
Air Force	1.15
	[0.10]
More than one branch of service	0.94
	[0.09]
Service component (out of the military omitted)	
Active component	0.50
	[0.04]**

Table B.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Service component (out of the military omitted)	
Activated National Guard or Reserve	0.52
	[0.06]**
National Guard or Reserve (not activated)	0.86
	[0.07]
VA disability rating (%; 10–20 omitted)	
0	0.61
	[0.23]
30–40	0.95
	[0.13]
50–60	0.97
	[0.12]
70–80	0.95
	[0.12]
90–100	0.79
	[0.10]
No VA rating	1.18
	[0.17]
VA rating pending or on appeal	1.08
	[0.14]
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.97
	[0.05]
W1–W5	0.94
	[0.21]
O1–O3	1.06
	[0.14]
O4–O6	1.24
	[0.17]

Table B.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Amputation	0.89
	[0.12]
Anxiety	1.32
	[0.09]**
Blind or severe visual loss	1.14
	[0.13]
Burns (severe)	0.92
	[0.12]
Depression (self-reported)	1.69
	[0.11]**
PTSD (self-reported)	1.45
	[0.11]**
Probable depression (positive screen)	2.45
	[0.14]**
Probable PTSD (positive screen)	1.93
	[0.13]**
Probable problem drinking (positive screen)	1.28
	[0.06]**
Severe back, neck, or shoulder problems	1.10
	[0.05]
Severe hearing loss	1.07
	[0.06]
Severe knee injuries or problems	0.96
	[0.04]
Spinal cord injury	1.01
	[0.06]
TBI	1.00
	[0.05]
Tinnitus	1.05
	[0.05]

Table B.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Other severe physical injuries	1.04
	[0.05]
Other severe mental injuries	1.41
	[0.09]**
No injury reported	0.35
	[0.19]*
Observations	12,143

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Analyses for Chapter 4

Technical Appendix C.1: Alumni Characteristics and General Self-Reported Health

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with alumni's general self-reported health status. Variables used in the analysis are listed in Table C.1.

Table C.2 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- There are no gender differences in general self-reported heath.
- Alumni who identified as Hispanic or Latino or as Black or African-American were 1.3 and 1.6 times more likely, respectively, than White alumni to report fair or poor health. Asian alumni were 2.2 times more likely than White alumni.
- Single alumni were less likely than married alumni to report fair or poor health.
- Alumni reports of fair or poor health status were more likely for age groups of 36 years or older. For example, 36- to 40-year-old alumni were 1.2 times as likely to report fair or poor health as 26- to 30-year-old alumni, and alumni 56 or older were 2.5 times as likely.
- Marines were less likely to report fair or poor health than alumni who served in the Army.

Table C.1
Variables Used in Logistic Regression of General Self-Reported Health on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1, along with BMI (calculated from alumni's self-reports of height and weight) and drinking status. Drinking status was included as two variables: Nondrinker—coded as a 1 if respondent selected "never" when asked, "How often do you have a drink containing alcohol?" Nonproblem drinker—coded as 1 if respondent consumes alcohol but did not screen positive for probable problem drinking on the AUDIT-C. This coding then results in problem drinkers (i.e., those who screened positive for probable problem drinking on the AUDIT-C) as the reference group.
Outcome variable	Survey item: "In general, would you say your health is . . ." Response coded as a 1 if "fair" or "poor" was selected. Response coded as a 0 if "excellent," "very good," or "good" was selected.

- Service members who are active component or who are activated National Guard/Reserve were 1.2 and 1.5 times more likely, respectively, to report fair or poor health than alumni who are out of the military.
- Alumni with VA disability ratings of 50 percent or greater were more likely to report fair or poor health status than those with ratings of 10–20 percent. For example, alumni with VA ratings of 50 percent to 60 percent were 1.4 times more likely to report fair or poor health than alumni with ratings of 10–20 percent, and those with ratings of 90 percent to 100 percent were 2.3 times more likely.
- Alumni whose highest pay grade was E1–E4 were most likely to report fair or poor health status relative to alumni reaching other pay grades.
- Alumni reporting amputation or PTSD were less likely to report fair or poor health than those without amputation or PTSD. Alumni reporting depression; spinal cord injury; TBI; severe back, neck, or shoulder problems; severe knee injuries or problems; other severe physical injuries; or other severe mental injuries were between 1.2 and 1.7 times more likely to report fair or poor health than those without the injury. Alumni who screened positive for probable depression or PTSD were 3.0 and 1.5 times more likely, respectively, to report fair or poor health than those who did not screen positive. It is unclear why those who reported PTSD and those who screened positive for probable PTSD were differentially likely to reported fair or poor health.
- Having a higher BMI was associated with a slightly greater likelihood of reporting fair or poor health status than having a lesser BMI.
- Compared with alumni who screened positive for probable problem drinking, alumni who did not drink or who consumed alcohol but did not screen positive for probable drinking were 1.4 and 1.1 times more likely, respectively, to have reported fair or poor health status.

Table C.2
Relationship Among Explanatory Variablesand General Self-Reported Fair or Poor Health

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	1.10
	[0.08]
Race/ethnicity (White omitted)	
Black or African-American	1.59
	[0.14]**
Hispanic or Latino	1.33
	[0.09]**
American Indian or Alaska Native	0.96
	[0.18]
Asian	2.20
	[0.35]**

Table C.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Race/ethnicity (White omitted)	
Native Hawaiian or other Pacific Islander	1.45
	[0.40]
Other	1.44
	[0.28]
More than one race/ethnicity category selected	1.12
	[0.10]
Marital status (married omitted)	
Never married	0.82
	[0.06]**
Previously married	0.96
	[0.05]
Age (26–30 omitted)	
18–25	1.16
	[0.12]
31–35	1.06
	[0.07]
36–40	1.19
	[0.09]*
41–45	1.26
	[0.10]**
46–50	1.77
	[0.16]**
51–55	1.98
	[0.25]**
56+	2.46
	[0.39]**
Branch of service (Army omitted)	
Navy/Coast Guard	0.97
	[0.08]
Marines	0.85
	[0.05]*

Table C.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Branch of service (Army omitted)	
Air Force	1.04
	[0.09]
More than one branch of service selected	1.06
	[0.10]
Service component (out of the military omitted)	
Active component	1.22
	[0.10]*
Activated National Guard or Reserve	1.50
	[0.14]**
National Guard or Reserve (not activated)	1.01
	[0.08]
VA disability rating (%; 10–20 omitted)	
0	1.11
	[0.43]
30–40	1.17
	[0.16]
50–60	1.35
	[0.17]*
70–80	1.70
	[0.21]**
90–100	2.27
	[0.28]**
No VA rating	1.26
	[0.17]
VA rating pending or on appeal	2.03
	[0.26]**
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.85
	[0.05]**
W1–W5	0.75
	[0.16]

Table C.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
O1–O3	0.61
	[0.07]**
O4–O6	0.64
	[0.08]**
Injury type[a]	
Amputation	0.52
	[0.07]**
Anxiety	1.12
	[0.07]
Blind or severe visual loss	1.07
	[0.14]
Burns (severe)	0.93
	[0.13]
Depression (self-reported)	1.33
	[0.08]**
PTSD (self-reported)	0.84
	[0.06]*
Probable depression (positive screen)	3.03
	[0.16]**
Probable PTSD (positive screen)	1.53
	[0.10]**
Severe back, neck, or shoulder problems	1.74
	[0.08]**
Severe hearing loss	1.01
	[0.06]
Severe knee injuries or problems	1.18
	[0.06]**
Spinal cord injury	1.53
	[0.10]**
TBI	1.16
	[0.06]**

Table C.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Tinnitus	1.02
	[0.05]
Other severe physical injuries	1.34
	[0.07]**
Other severe mental injuries	1.48
	[0.11]**
No injury reported	0.50
	[0.15]*
BMI	1.05
	[0.01]**
Alcohol consumption status (probable problem drinking omitted)	
Nondrinker	1.39
	[0.08]**
Nonproblem drinker	1.12
	[0.06]*
Observations	12,054

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Technical Appendix C.2: Alumni Characteristics and Limitations Due to Physical Health

This appendix details a regression analysis exploring alumni characteristics and their associations with scores on a measure that assesses limitations in daily activities due to physical health. Variables used in the analysis are listed in Table C.3.

Table C.4 provides the weighted multiple regression coefficients associated with each explanatory variable. The results show that there is some variation in physical limitations scores based on respondent characteristics. However, the magnitude of the regression coefficients is small, and in most cases fewer than three points on the 100-point scale. Given these results, most respondent characteristics are not meaningfully associated with differential levels of physical limitations. These are the respondent characteristics associated with changes of three points or greater on the scale:

Table C.3
Variables Used in Regression of Limitations Due to Physical Health on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1, BMI
Outcome variable	Survey questions: Four questions about the extent to which physical health has interfered with work or activities (e.g., "cut down the amount of time you spent on work or other activities?") "Yes" responses are coded as 0, and "no" responses are coded as a 100. The total score is the average of these responses, resulting in a range from 0 to 100, with 0 indicating greater limitations to daily activity due to physical health and 100 indicating no limitations to daily activity due to physical health.

- Limitations increase with age, with alumni ages 31 and up reporting more limitations than the 26- to 30-year-old reference group. Alumni ages 51 and up reported decreases of about four points on the scale.
- Physical limitations increase as the VA disability rating increases, with each increasing VA disability rating group reporting more limitations than the 10–20 percent VA rating reference group. Alumni with ratings of 70–80 percent reported decreases of about four points on the scale, and alumni with ratings of 90 percent to 100 percent reported decreases of about 5.7 points.
- There are no significant differences in limitations based on pay grade.
- Alumni reporting spinal cord injury show decreases of 3.0 points on the scale, and alumni reporting severe back, neck, and shoulder problems show decreases of 4.3 points. Alumni who screened positive for probable depression show decreases of 6.0 points.
- Alumni who screened positive for probable problem drinking reported fewer limitations than those who did not screen positive.

Table C.4.
Relationship Among Explanatory Variables and Limitations Due to Physical Health

Explanatory Variable	Regression Coefficients [Standard Error]
Sex (male omitted)	
Female	-2.01
	[0.34]**
Race/ethnicity (White omitted)	
Black or African-American	-0.38
	[0.42]
Hispanic or Latino	-0.10
	[0.33]
American Indian or Alaska Native	-0.96
	[0.84]

Table C.4—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Race/ethnicity (White omitted)	
Asian	-0.11
	[0.81]
Native Hawaiian or other Pacific Islander	-2.66
	[1.25]*
Other	-0.72
	[0.86]
More than one race/ethnicity category selected	-0.80
	[0.42]
Marital status (married omitted)	
Never married	0.77
	[0.33]*
Previously married	0.47
	[0.27]
Age (26–30 omitted)	
18–25	0.13
	[0.50]
31–35	-0.68
	[0.31]*
36–40	-1.18
	[0.36]**
41–45	-1.99
	[0.38]**
46–50	-2.48
	[0.42]**
51–55	-3.73
	[0.55]**
56+	-4.39
	[0.72]**
Branch of service (Army omitted)	
Navy/Coast Guard	-0.55
	[0.41]

Table C.4—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Branch of service (Army omitted)	
Marines	1.39
	[0.31]**
Air Force	-0.53
	[0.45]
More than one branch selected	-0.30
	[0.43]
Service component (Out of the military omitted)	
Active component	-1.96
	[0.39]**
Activated National Guard or Reserve	-2.53
	[0.45]**
National Guard or Reserve (not activated)	0.74
	[0.37]*
VA disability rating (%; 10–20 omitted)	
0	-0.02
	[1.56]
30–40	-2.31
	[0.61]**
50–60	-1.98
	[0.56]**
70–80	-3.83
	[0.54]**
90–100	-5.67
	[0.55]**
No VA rating	-1.19
	[0.58]*
VA rating pending or on appeal	-3.93
	[0.57]**
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.45
	[0.27]

Table C.4—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
W1–W5	-0.48
	[0.93]
O1–O3	0.52
	[0.58]
O4–O6	1.00
	[0.62]
Injury type[a]	
Amputation	-1.47
	[0.62]*
Anxiety	-0.45
	[0.31]
Blind or severe visual loss	0.17
	[0.54]
Burns (severe)	-0.12
	[0.63]
Depression (self-reported)	-0.77
	[0.30]**
PTSD (self-reported)	1.39
	[0.33]**
Probable depression (positive screen)	-5.99
	[0.28]**
Probable PTSD (positive screen)	-2.45
	[0.31]**
Probable problem drinking (positive screen)	1.46
	[0.22]**
Severe back, neck, or shoulder problems	-4.27
	[0.24]**
Severe hearing loss	0.16
	[0.28]
Severe knee injuries or problems	-1.52
	[0.22]**

Table C.4—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Injury type[a]	
Spinal cord injury	-3.01
	[0.28]**
TBI	-1.42
	[0.24]**
Tinnitus	-0.24
	[0.23]
Other severe physical injuries	-2.31
	[0.23]**
Other severe mental injuries	-0.93
	[0.32]**
No injury reported	2.67
	[0.74]**
BMI	-0.05
	[0.02]**
Observations	11,788

NOTE: Physical limitations are measured using the physical role functioning score from the RAND-36. Higher scores indicate fewer limitations to daily activities due to physical health.

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Technical Appendix C.3: Alumni Characteristics and Exercise Frequency

This appendix details a regression analysis exploring alumni characteristics and exercise frequency. Variables used in the analysis are listed in Table C.5.

Table C.5
Variables Used in Logistic Regression of Exercise Frequency on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1, BMI
Outcome variable	Survey question: "In a typical week, how many days do you do any moderate-intensity physical activity or exercise, such as a brisk walk, jog, cycle, play adapted sports, swim . . ."
	Responses of "less than once a week" were coded as a 0. Responses of 1 through 7 times per week were coded as that number.

Table C.6 provides the weighted multiple regression coefficients associated with each explanatory variable. However, the magnitude of the regression coefficients in most cases is small on the scale of 0 to 7, suggesting that many characteristics are not related to exercise frequency in substantial ways.

- Women exercised 0.2 days less than men per week.
- There were no racial/ethnic differences in exercise frequency.
- Single and previously married alumni exercised 0.4 and 0.3 more days per week than married alumni, respectively.
- Alumni ages 18 to 25 year old exercised 0.2 days per week more than 26- to 30-year-old alumni. However, alumni of ages 36 and up all exercised 0.3 to 0.5 days less than 26- to 30-year-old alumni.
- Alumni who served in the Navy/Coast Guard or the Air Force exercised about 0.2 days less than Army alumni. Marines exercised about 0.2 days more than Army alumni.
- Active component alumni exercised nearly one more day a week than alumni who are out of the military. Activated and nonactivated National Guard/Reserve exercised 0.4 and 0.1 more days per week, respectively, than alumni out of the military.
- There was no significant variation in exercise frequency based on VA disability rating.
- Alumni of all pay grades exercised on more days per week than those with pay grades E1–E4, ranging from 0.2 more days per week for alumni who were E5–E9 to 0.6 days more per week for alumni who were O4–O6
- Alumni who reported depression; spinal cord injury; severe back, neck, or shoulder problems; or severe knee injuries or problems exercised on fewer days per week than those without such injuries. Alumni who screened positive for probable depression also exercised on fewer days per week than those who did not screen positive. Alumni with TBI or tinnitus exercised 0.1 more days per week than those without TBI or tinnitus.
- Higher BMI was associated with decreased frequency in exercising.

Table C.6
Relationship Among Explanatory Variables and Exercise Frequency

Explanatory Variable	Regression Coefficients [Standard Error]
Sex (male omitted)	
Female	-0.17
	[0.06]**
Race/ethnicity (White omitted)	
Black or African-American	0.08
	[0.07]
Hispanic or Latino	0.08
	[0.06]
American Indian or Alaska Native	0.18
	[0.16]

Table C.6—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Race/ethnicity (White omitted)	
Asian	-0.02
	[0.14]
Native Hawaiian or other Pacific Islander	-0.02
	[0.23]
Other	0.00
	[0.15]
More than one race/ethnicity category selected	0.10
	[0.07]
Marital status (married omitted)	
Never married	0.42
	[0.06]**
Previously married	0.25
	[0.05]**
Age (26–30 omitted)	
18–25	0.21
	[0.09]**
31–35	-0.10
	[0.05]
36–40	-0.29
	[0.06]**
41–45	-0.46
	[0.07]**
46–50	-0.48
	[0.07]**
51–55	-0.39
	[0.10]**
56+	-0.53
	[0.12]**
Branch of service (Army omitted)	
Navy/Coast Guard	-0.23
	[0.07]**

Table C.6—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Branch of service (Army omitted)	
Marines	0.15
	[0.06]**
Air Force	-0.26
	[0.07]**
More than one branch of service selected	-0.04
	[0.08]
Service component (out of military omitted)	
Active component	0.80
	[0.07]**
Activated National Guard or Reserve	0.42
	[0.08]**
National Guard or Reserve (not activated)	0.13
	[0.06]*
VA disability rating (%; 10–20 omitted)	
0	0.06
	[0.27]
30–40	0.03
	[0.11]
50–60	0.04
	[0.10]
70–80	-0.07
	[0.10]
90–100	-0.15
	[0.10]
No VA rating	0.20
	[0.11]
VA rating pending or on appeal	-0.14
	[0.11]
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.21
	[0.05]**

Table C.6—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
W1–W5	0.33
	[0.17]*
O1–O3	0.52
	[0.10]**
O4–O6	0.58
	[0.11]**
Injury type[a]	
Amputation	0.04
	[0.11]
Anxiety	-0.01
	[0.05]
Blind or severe visual loss	0.05
	[0.11]
Burns (severe)	0.09
	[0.12]
Depression (self-reported)	-0.25
	[0.05]**
PTSD (self-reported)	0.04
	[0.06]
Probable depression (positive screen)	-0.79
	[0.05]**
Probable PTSD (positive screen)	-0.11
	[0.05]*
Probable problem drinking (positive screen)	0.07
	[0.04]
Severe back, neck, or shoulder problems	-0.24
	[0.04]**
Severe hearing loss	0.12
	[0.05]*
Severe knee injuries or problems	-0.08
	[0.04]*

Table C.6—Continued

Explanatory Variable	Regression Coefficients [Standard Error]
Injury type[a]	
Spinal cord injury	-0.16
	[0.05]**
TBI	0.14
	[0.04]**
Tinnitus	-0.04
	[0.04]
Other severe physical injuries	-0.05
	[0.04]
Other severe mental injuries	-0.03
	[0.06]
No injury reported	0.05
	[0.15]
BMI	-0.04
	[0.00]**
Observations	11,952

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.
* $p < .05$, ** $p < .01$

Technical Appendix C.4: Alumni Characteristics and Limitations of Doing Vigorous Activity

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with alumni self-reports of being limited in doing vigorous activity. Variables used in the analysis are listed in Table C.7.

Table C.8 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- Women were 1.6 times more likely to report being limited a lot relative to men.
- Alumni who reported being Hispanic or Latino were less likely to feel limited than White alumni.
- Married alumni were most likely to report being limited a lot.
- From age 36 onward, alumni reports of being limited a lot increased. Alumni ages 36 to 40 were 1.2 times as likely as 26- to 30-year-olds to report being limited, and alumni age 56 or older were 2.7 times more likely.
- Navy/Coast Guard and Marines were less likely to report feeling limited than Army alumni.

Table C.7
Variables Used in Logistic Regression of Limitations of Doing Vigorous Activity on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey item: Response to the question "Does *your health now limit you* in these activities? If so, how much?" in reference to "*vigorous activities*, such as running, lifting heavy objects, participating in strenuous sports."
	Response coded as a 1 if respondent selected "yes, limited a lot."
	Response coded as a 0 if respondent selected "yes, limited a little" or "no, not limited at all."

- Active component alumni and activated National Guard/Reserve were both about two times more likely to report limitations than alumni who are out of the military. National Guard/Reserve alumni who were not activated were slightly less likely to report limitations than alumni out of the military.
- Alumni with VA disability ratings of 50–60 percent were 1.5 times more likely to report limitations relative to those with ratings of 10–20 percent. Those with ratings of 90–100 percent were nearly three times more likely to report being limited than alumni with 10–20 percent ratings.
- Alumni with pay grades of E1 to E4 were more likely to report feeling limited relative to other pay grades.
- Alumni reporting amputation; spinal cord injury; severe back, neck, or shoulder problems; severe knee injuries or problems; or other physical injuries reported greater limitations than alumni without those injuries. Alumni who screened positive for probable depression were also more likely to report greater limitations. Alumni reporting PTSD or severe hearing loss were less likely to report being limited relative to those without those injuries.
- Alumni who screen positive for probable problem drinking were less likely to report being limited a lot than those who did not screen positive.

Table C.8
Relationship Among Explanatory Variables and Reporting Being "Limited a Lot" in Vigorous Activities

Explanatory Variable	Odds Ratios [Standard Error]
Sex (male omitted)	
Female	1.59
	[0.12]**
Race/ethnicity (White omitted)	
Black or African-American	0.86
	[0.07]
Hispanic or Latino	0.75
	[0.05]**

Table C.8—Continued

Explanatory Variable	Odds Ratios [Standard Error]
Race/ethnicity (White omitted)	
American Indian or Alaska Native	0.73
	[0.13]
Asian	0.78
	[0.12]
Native Hawaiian or other Pacific Islander	1.41
	[0.45]
Other	0.71
	[0.13]
More than one race/ethnicity category selected	1.08
	[0.09]
Marital status (married omitted)	
Never married	0.64
	[0.04]**
Previously married	0.85
	[0.05]**
Age (26–30 omitted)	
18–25	1.07
	[0.11]
31–35	1.02
	[0.06]
36–40	1.20
	[0.09]*
41–45	1.55
	[0.12]**
46–50	1.59
	[0.14]**
51–55	1.80
	[0.22]**
56+	2.73
	[0.47]**

Table C.8—Continued

Explanatory Variable	Odds Ratios [Standard Error]
Branch of service (Army omitted)	
Navy/Coast Guard	0.84
	[0.07]*
Marines	0.65
	[0.04]**
Air Force	1.03
	[0.09]
More than one branch of service selected	0.96
	[0.09]
Service component (Out of the military omitted)	
Active component	1.90
	[0.16]**
Activated National Guard or Reserve	2.20
	[0.22]**
National Guard or Reserve (not activated)	0.86
	[0.07]*
VA disability rating (%; 10–20 omitted)	
0	0.90
	[0.35]
30–40	1.17
	[0.15]
50–60	1.46
	[0.18]**
70–80	1.88
	[0.22]**
90–100	2.75
	[0.32]**
No VA rating	0.87
	[0.11]
VA rating pending or on appeal	1.78
	[0.22]**

Table C.8—Continued

Explanatory Variable	Odds Ratios [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.82
	[0.04]**
W1–W5	0.88
	[0.17]
O1–O3	0.74
	[0.09]*
O4–O6	0.63
	[0.08]**
Injury type[a]	
Amputation	1.31
	[0.16]*
Anxiety	1.09
	[0.06]
Blind or severe visual loss	0.91
	[0.12]
Burns (severe)	1.09
	[0.15]
Depression (self-reported)	1.10
	[0.06]
PTSD (self-reported)	0.74
	[0.05]**
Probable depression (positive screen)	2.22
	[0.12]**
Probable PTSD (positive screen)	1.08
	[0.07]
Probable problem drinking (positive screen)	0.69
	[0.03]**
Severe back, neck, or shoulder problems	2.32
	[0.11]**
Severe hearing loss	0.88
	[0.05]*

Table C.8—Continued

Explanatory Variable	Odds Ratios [Standard Error]
Injury type[a]	
Severe knee injuries or problems	1.54
	[0.07]**
Spinal cord injury	2.45
	[0.17]**
TBI	0.98
	[0.05]
Tinnitus	0.96
	[0.05]
Other severe physical injuries	1.95
	[0.10]**
Other severe mental injuries	0.94
	[0.07]
No injury reported	0.40
	[0.10]**
Observations	12,288

[a] All injury types are self-reported, except for probable depression, problem drinking, and PTSD, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Analyses for Chapter 5

Technical Appendix D.1: Alumni Characteristics and Use of VA's Vocational Rehabilitation and Employment Program

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with alumni self-reports of use of the VA Vocational Rehabilitation and Employment (VR&E) Program. Variables used in the analysis are listed in Table D.1. To restrict our analysis to those respondents most likely to be eligible for VR&E, this analysis was conducted using only the subsample of respondents who had VA ratings of 10 percent or greater. Respondents with a VA rating of zero, no VA rating, or whose rating was pending or on appeal were excluded from the analysis.

Table D.2 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- There are no significant gender differences in VR&E use.
- Hispanic or Latino alumni were 30 percent more likely than White alumni to use VR&E.
- There are no significant differences based on marital status.
- The odds of using VR&E were smaller for alumni ages 46 and older when compared with alumni between the ages of 26 and 30.
- There are no service-specific differences in VR&E use.
- Relative to alumni who are out of the military, active component and activated National Guard or Reserve alumni were less likely to use VR&E.
- Relative to alumni with VA disability ratings of 10–20 percent, alumni with higher disability ratings were 1.8 to 2.8 times as likely to use VR&E.
- Alumni with a highest pay grade of O1–O3 were less likely to use VR&E than alumni who reached a pay grade of E1–E4.

Table D.1
Variables Used in Logistic Regression of VR&E Program Use on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey question: "Which of the following VA or government benefits are you using to pursue your education?" Response coded as a 1 if "VA's Vocational Rehabilitation and Employment Program (VR&E)" was selected. Response coded as a 0 if not selected.

- Alumni with several types of injuries were more likely to use VR&E than those without. These include amputation (64 percent more likely), TBI (26 percent more likely), and severe knee injuries or problems (23 percent).

Table D.2
Relationship Among Explanatory Variables and Using VA's Vocational Rehabilitation and Employment Program

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	1.14
	[0.15]
Race/ethnicity (White omitted)	
Black or African-American	1.33
	[0.20]
Hispanic or Latino	1.30
	[0.15]*
American Indian or Alaska Native	0.74
	[0.26]
Asian	0.98
	[0.33]
Native Hawaiian or other Pacific Islander	2.09
	[0.85]
Other	1.54
	[0.45]
More than one race/ethnicity category selected	1.04
	[0.17]
Marital status (married omitted)	
Never married	1.01
	[0.12]
Previously married	0.87
	[0.09]
Age (26–30 omitted)	
18–25	0.96
31–35	0.93
	[0.10]

Table D.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Age (26–30 omitted)	
36–40	0.95
	[0.12]
41–45	0.83
	[0.12]
46–50	0.58
	[0.11]**
51–55	0.44
	[0.12]**
56+	0.47
	[0.20]
Branch of service (Army omitted)	
Navy/Coast Guard	1.29
	[0.18]
Marines	0.81
	[0.10]
Air Force	1.08
	[0.18]
More than one service	1.22
	[0.21]
Service component (out of the military omitted)	
Active component	0.45
	[0.13]**
Activated National Guard or Reserve	0.46
	[0.16]*
National Guard or Reserve (not activated)	0.80
	[0.14]
VA disability rating (%; 10–20 omitted)	
30–40	1.84
	[0.50]*
50–60	2.81
	[0.72]**
70–80	2.50

Table D.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
VA disability rating (%; 10–20 omitted)	
90–100	1.94
	[0.51]*
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.86
	[0.08]
W1–W5	0.29
	[0.22]
O1–O3	0.58
	[0.16]*
O4–O6	0.67
	[0.23]
Injury type+	
Amputation	1.64
	[0.31]**
Anxiety	0.89
	[0.10]
Blind or severe visual loss	1.25
	[0.26]
Burns (severe)	0.97
	[0.22]
Depression (self-reported)	0.96
	[0.11]
PTSD (self-reported)	1.13
	[0.15]
Probable depression (positive screen)	1.02
	[0.11]
Probable PTSD (positive screen)	1.01
	[0.12]
Probable problem drinking (positive screen)	1.08
	[0.09]
Severe back, neck, or shoulder problems	0.98
	[0.09]

Table D.2—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Severe hearing loss	0.80
	[0.09]
Severe knee injuries or problems	1.23
	[0.10]*
Spinal cord injury	0.99
	[0.11]
TBI	1.26
	[0.12]*
Tinnitus	0.96
	[0.08]
Other severe physical injuries	1.15
	[0.10]
Other severe mental injuries	1.05
	[0.13]
No injury reported	0.24
	[0.24]
Observations	8,807

NOTE: This analysis was conducted using only data from respondents reporting a VA disability rating of 10 percent or greater.

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Technical Appendix D.2: Alumni Characteristics and Use of the Post-9/11 GI Bill

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with alumni self-reports of use of the Post-9/11 GI Bill. Variables used in the analysis are listed in Table D.3. Because the eligibility criteria for Post-9/11 GI Bill benefits are broad, we conduct this analysis on the full sample.

Table D.4 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- Male and female alumni do not differ significantly in the likelihood of use of the Post-9/11 GI Bill.

Table D.3
Variables Used in Logistic Regression of Use of the Post-9/11 GI Bill on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey question: "Which of the following VA or government benefits are you using to pursue your education?" Response coded as a 1 if "Post-9/11 GI Bill or otherwise known as the New GI Bill" was selected. Response coded as a 0 if not selected.

- Alumni who are Black or African-America or who are Hispanic or Latino were about 34 percent and 30 percent more likely, respectively, to use Post-9/11 GI Bill benefits relative to White alumni. Alumni who selected "other" in response to the race/ethnicity question were 76 percent more likely to use the benefit relative to White alumni.
- There are no significant differences based on marital status.
- Age is significantly associated with Post-9/11 GI Bill use. Alumni between 18 and 25 were 35 percent more likely to use the benefits compared with alumni between 26 and 30 years of age. Alumni in other age categories were less likely to use the benefit than alumni who ages 26 to 30.
- There are no service-specific differences.
- Alumni who are out of the military were most likely to use Post-9/11 GI Bill benefits compared with those who are active duty or National Guard or Reserve.
- Alumni with a VA disability rating of 90 percent or 100 percent and those with no VA disability rating were less likely to report using the Post-9/11 GI Bill compared with alumni with a VA rating of 10–20 percent.
- Alumni with a rank of E5 to E9 were 29 percent more likely to use the Post-9/11 GI Bill than those with a rank of E1 to E4.
- There are few differences in Post-9/11 GI Bill benefit use based on injury type. However, alumni with amputation and alumni who screened positive for probable depression were less likely to use their Post-9/11 GI Bill benefits than those who do not have amputation or who did not screen positive.
- Probable problem drinking was not related to Post-9/11 GI Bill use.

Table D.4
Relationship Among Explanatory Variables and Using the Post-9/11 GI Bill

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	1.13
	[0.09]
Race/ethnicity (White omitted)	
Black or African-American	1.34
	[0.13]**

Table D.4—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Race/ethnicity (White omitted)	
Hispanic or Latino	1.30
	[0.10]**
American Indian or Alaska Native	1.04
	[0.23]
Asian	1.11
	[0.22]
Native Hawaiian or other Pacific Islander	1.14
	[0.38]
Other	1.76
	[0.34]**
More than one race/ethnicity category selected	1.16
	[0.11]
Marital status (married omitted)	
Never married	1.01
	[0.07]
Previously married	0.92
	[0.06]
Age (26–30 omitted)	
18–25	1.35
	[0.15]**
31–35	0.64
	[0.04]**
36–40	0.49
	[0.04]**
41–45	0.40
	[0.04]**
46–50	0.31
	[0.04]**
51–55	0.24
	[0.04]**
56+	0.17
	[0.05]**

Table D.4—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Branch of service (Army omitted)	
Navy/Coast Guard	1.17
	[0.11]
Marines	1.11
	[0.08]
Air Force	0.84
	[0.09]
More than one service	0.95
	[0.12]
Service component (out of the military omitted)	
Active component	0.15
	[0.02]**
Activated National Guard or Reserve	0.38
	[0.05]**
National Guard or Reserve (not activated)	0.77
	[0.07]**
VA disability rating (%; 10–20 omitted)	
0	0.59
	[0.22]
30–40	1.14
	[0.15]
50–60	1.06
	[0.14]
70–80	1.01
	[0.13]
90–100	0.74
	[0.10]*
No VA rating	0.67
	[0.11]*
VA rating pending or on appeal	1.04
	[0.14]

Table D.4—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	1.29
	[0.08]**
W1–W5	1.05
	[0.31]
O1–O3	0.98
	[0.16]
O4–O6	0.85
	[0.18]
Injury type[a]	
Amputation	0.66
	[0.11]**
Anxiety	0.99
	[0.07]
Blind or severe visual loss	1.05
	[0.16]
Burns (severe)	0.89
	[0.14]
Depression (self-reported)	1.02
	[0.07]
PTSD (self-reported)	1.01
	[0.08]
Probable depression (positive screen)	0.84
	[0.05]**
Probable PTSD (positive screen)	1.09
	[0.08]
Probable problem drinking (positive screen)	1.09
	[0.06]
Severe back, neck, or shoulder problems	0.95
	[0.05]
Severe hearing loss	1.02
	[0.07]

Table D.4—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Severe knee injuries or problems	1.01
	[0.05]
Spinal cord injury	0.93
	[0.07]
TBI	0.91
	[0.05]
Tinnitus	0.96
	[0.05]
Other severe physical injuries	0.98
	[0.06]
Other severe mental injuries	0.85
	[0.07]
No injury reported	1.09
	[0.27]
Observations	12,345

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Technical Appendix D.3: Alumni Characteristics and Labor Pool Status

This appendix details a logistic regression analysis exploring alumni characteristics and labor pool status. Variables used in the analysis are listed in Table D.5.

Table D.6 provides the weighted odds ratios associated with each explanatory variable. The results show that:

Table D.5
Variables Used in Logistic Regression of Labor Pool Status on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey questions: "Are you currently employed in paid work, either full time or part time?" "During the LAST 4 WEEKS, did you actively look for work?" Response coded as a 1 if respondent selects both "no" for the employment question and "no" for not looking for work in the past four weeks. Response coded as a 0 in all other conditions (i.e., if employed or if unemployed and looking for work).

- Female alumni were 28 percent more likely to be out of the labor pool than male alumni.
- There are no differences in labor pool status based on race or marital status.
- Alumni ages 46 and up were more likely to be out of the labor pool relative to alumni ages 26 to 30.
- Alumni who served in the Army were most likely to be out of the labor pool relative to alumni who served in other branches.
- Active component alumni and alumni who are in the National Guard or Reserve (not activated) were less likely to be out of the labor pool relative to alumni who are out of the military.
- Alumni with VA disability ratings of 50 percent or greater were more likely to be out of the labor pool relative to alumni with ratings of 10–20 percent. This likelihood can range dramatically with alumni; alumni with 50–60 percent disability ratings were 1.6 times more likely to be out of the labor pool, alumni with 70–80 percent ratings were 2.7 times more likely, and alumni with 90–100 percent ratings were 8.0 times more likely than those with 10–20 percent ratings.
- Alumni with highest pay grades of E1–E4 were most likely to be out of the labor pool relative to other alumni.
- Alumni who reported having amputation, blindness or severe visual loss, depression, spinal cord injury, TBI, or other severe mental injuries had a greater likelihood of being out of the labor pool. Alumni who screened positive for probable depression also had a greater likelihood of being out of the labor pool. The likelihood ranges from 13 percent for those with spinal cord injury to 50 percent for those screening positive for probable depression (relative to alumni without these conditions).
- Severe hearing loss and screening positive for probable problem drinking were the only injury types or mental health conditions associated with a lower likelihood of being out of the labor force (relative to alumni without these conditions).

Table D.6
Relationship Among Explanatory Variables and Being out of Labor Pool

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	1.28
	[0.09]**
Race/ethnicity (White omitted)	
Black or African-American	1.09
	[0.09]
Hispanic or Latino	1.06
	[0.07]
American Indian or Alaska Native	0.85
	[0.16]

Table D.6—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Race/ethnicity (White omitted)	
Asian	1.10
	[0.22]
Native Hawaiian or other Pacific Islander	1.37
	[0.36]
Other	0.98
	[0.19]
More than one race/ethnicity category selected	1.08
	[0.10]
Marital status (married omitted)	
Never married	1.07
	[0.08]
Previously married	1.11
	[0.06]
Age (26–30 omitted)	
18–25	1.05
	[0.12]
31–35	0.91
	[0.06]
36–40	1.08
	[0.08]
41–45	1.05
	[0.09]
46–50	1.32
	[0.12]**
51–55	1.81
	[0.22]**
56+	2.82
	[0.44]**
Branch of service (Army omitted)	
Navy/Coast Guard	0.81
	[0.07]*

Table D.6—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Branch of service (Army omitted)	
Marines	0.74
	[0.05]**
Air Force	0.78
	[0.07]**
More than one service	1.01
	[0.10]
Service component (out of the military omitted)	
Active component	0.72
	[0.06]**
Activated National Guard or Reserve	0.99
	[0.10]
National Guard or Reserve (not activated)	0.46
	[0.04]**
VA disability rating (%; 10–20 omitted)	
0	0.68
	[0.35]
30–40	1.04
	[0.19]
50–60	1.64
	[0.27]**
70–80	2.74
	[0.44]**
90–100	8.00
	[1.27]**
No VA rating	1.17
	[0.20]
VA rating pending or on appeal	2.10
	[0.35]**
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	0.72
	[0.04]**

Table D.6—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
W1–W5	0.50
	[0.11]**
O1–O3	0.43
	[0.06]**
O4–O6	0.36
	[0.05]**
Injury type[a]	
Amputation	1.28
	[0.16]**
Anxiety	1.05
	[0.07]
Blind or severe visual loss	1.29
	[0.16]*
Burns (severe)	0.92
	[0.13]
Depression (self-reported)	1.24
	[0.08]**
PTSD (self-reported)	0.99
	[0.07]
Probable depression (positive screen)	1.50
	[0.09]**
Probable PTSD (positive screen)	0.97
	[0.06]
Probable problem drinking (positive screen)	0.69
	[0.03]**
Severe back, neck, or shoulder problems	0.98
	[0.05]
Severe hearing loss	0.87
	[0.05]*
Severe knee injuries or problems	0.95
	[0.05]

Table D.6—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Spinal cord injury	1.13
	[0.07]*
TBI	1.28
	[0.06]**
Tinnitus	0.94
	[0.05]
Other severe physical injuries	1.02
	[0.05]
Other severe mental injuries	1.49
	[0.10]**
No injury reported	0.52
	[0.19]
Observations	12,299

[a] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

Technical Appendix D.4: Alumni Characteristics and Employment Status

This appendix details a logistic regression analysis exploring alumni characteristics and their associations with employment. Variables used in the analysis are listed in Table D.7. The sample was restricted such that only alumni who were employed part or full time or those who were unemployed and looked for work in the four weeks prior to the survey are included in the analyses.

Table D.8 provides the weighted odds ratios associated with each explanatory variable. The results show that:

- There are no gender differences in employment.
- Alumni who are Black or African-American, Native Hawaiian or other Pacific Islander, or who selected more than one race/ethnicity were less likely to be employed relative to White alumni.
- Never married and previously married alumni were less likely to be employed than married alumni.
- Alumni ages 18 to 25 were less likely to be employed than alumni who are 26 to 30. Alumni ages 31-years-old and older were up to 83 percent more likely to be employed than 26- to 30-year-old alumni.
- Alumni who were in the Marines or Air Force were 27 percent and 56 percent more likely, respectively, to be employed compared with those who served in the Army.

Table D.7
Variables Used in Logistic Regression of Employment Status on Alumni Characteristics

Variable Type	Variables Used
Explanatory variables included in analysis	All variables in Table A.1.
Outcome variable	Survey question: "Are you currently employed in paid work, either full time or part time?"
	Response coded as a 1 if respondent selects either "yes, full time" or "yes, part time."
	Response coded as a 0 if "No" is selected.

- Given that serving in the active component or in the National Guard or Reserve represents some form of employment, these alumni were more likely to report being employed than alumni who are out of the military.
- Alumni with VA disability ratings of 70 percent or higher or whose rating was pending were significantly less likely to be employed relative to alumni whose VA disability rating is 10–20 percent.
- Alumni with a highest pay grade of E5–E9 were 21 percent more likely to be employed than alumni with highest pay grade of E1–E4. Alumni reaching pay grades of O4–O6 were 52 percent more likely to be employed than those who reached E1–E4.
- Alumni with amputations were 63 percent more likely to be employed than those without amputations. Alumni who reported several other types of injuries, specifically depression; spinal cord injury; severe back, neck, or shoulder problems; severe knee injuries or problems; or other mental injuries were less likely to be employed than alumni without these injuries. Alumni who screened positive for probable depression were less likely to be employed than those who do not.
- Counterintuitively, those who screened positive for probable problem drinking were 20 percent more likely to be employed than those who do not.

Table D.8
Relationship Among Explanatory Variables and Being Employed (Full Time or Part Time)

Explanatory Variable	Odds Ratio [Standard Error]
Sex (male omitted)	
Female	0.97
	[0.10]
Race/ethnicity (White omitted)	
Black or African-American	0.55
	[0.06]**
Hispanic or Latino	0.90
	[0.08]
American Indian or Alaska Native	1.62
	[0.41]

Table D.8—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Race/ethnicity (White omitted)	
Asian	0.79
	[0.16]
Native Hawaiian or other Pacific Islander	0.44
	[0.16]*
Other	0.68
	[0.16]
More than one race/ethnicity category selected	0.78
	[0.09]*
Marital status (married omitted)	
Never married	0.68
	[0.06]**
Previously married	0.59
	[0.04]**
Age (26–30 omitted)	
18–25	0.53
	[0.07]**
31–35	1.20
	[0.10]*
36–40	1.46
	[0.15]**
41–45	1.37
	[0.15]**
46–50	1.72
	[0.22]**
51–55	1.55
	[0.28]*
56+	1.83
	[0.51]*
Branch of service (Army omitted)	
Navy/Coast Guard	1.11
	[0.12]

Table D.8—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Branch of service (Army omitted)	
Marines	1.27
	[0.10]**
Air Force	1.56
	[0.21]**
More than one service	1.04
	[0.14]
Service component (out of the military omitted)	
Active component	3.64
	[0.49]**
Activated National Guard or Reserve	1.51
	[0.21]**
National Guard or Reserve (not activated)	1.43
	[0.14]**
VA disability rating (%; 10–20 omitted)	
0	0.77
	[0.31]
30–40	0.83
	[0.14]
50–60	0.74
	[0.12]
70–80	0.59
	[0.09]**
90–100	0.34
	[0.06]**
No VA rating	0.98
	[0.18]
VA rating pending or on appeal	0.47
	[0.08]**
Highest pay grade/rank (E1–E4 omitted)	
E5–E9	1.21
	[0.09]**

Table D.8—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Highest pay grade/rank (E1–E4 omitted)	
W1–W5	1.42
	[0.47]
O1–O3	1.34
	[0.22]
O4–O6	1.52
	[0.30]*
Injury type[a]	
Amputation	1.63
	[0.33]*
Anxiety	1.01
	[0.08]
Blind or severe visual loss	1.00
	[0.18]
Burns (severe)	0.93
	[0.17]
Depression (self-reported)	0.85
	[0.07]*
PTSD (self-reported)	1.06
	[0.10]
Probable depression (positive screen)	0.67
	[0.05]**
Probable PTSD (positive screen)	1.01
	[0.09]
Probable problem drinking (positive screen)	1.19
	[0.07]**
Severe back, neck, or shoulder problems	0.83
	[0.05]**
Severe hearing loss	1.00
	[0.08]
Severe knee injuries or problems	0.85
	[0.05]**

Table D.8—Continued

Explanatory Variable	Odds Ratio [Standard Error]
Injury type[a]	
Spinal cord injury	0.78
	[0.07]**
TBI	0.91
	[0.06]
Tinnitus	1.10
	[0.07]
Other severe physical injuries	1.02
	[0.07]
Other severe mental injuries	0.75
	[0.07]**
No injury reported	0.84
	[0.24]
Observations	8,212

NOTE: Only alumni in the labor pool (i.e., alumni who were employed part or full time or those who were unemployed and looked for work in the four weeks prior to the survey) are included in the analyses.

[+] All injury types are self-reported, except for probable depression, PTSD, and problem drinking, which are calculated based on responses to validated screening instruments.

* $p < .05$, ** $p < .01$

What Health Challenges Face Wounded Warriors?

Each year, Wounded Warrior Project (WWP) conducts an annual assessment of its members (alumni) to understand how well its programs and services are supporting the mental, physical, and financial well- being of alumni.

WWP asked RAND to analyze the 2013 survey results to understand the challenges alumni are facing. Results may be used to assess, develop, or tailor programs and services for this group.

WWP strategic objective 1: ensure that Wounded Warriors are well adjusted in mind and spirit

- More than 50 percent of WWP alumni screen positive for one of the following psychological health problems: probable depression, probable PTSD, or probable alcohol misuse.
- Of the alumni who screen positive for probable depression, PTSD, or alcohol misuse, 37 percent to 47 percent report having difficulty getting mental health care, delaying care, or otherwise not getting the care they need.
- The most commonly reported barriers to care include:
  - Inconsistent treatment or lapses in treatment.
  - Discomfort with existing DoD or VA resources.
  - Concern about negative effects on career.
  - Concern about being viewed as weak.

WWP strategic objective 2: ensure that Wounded Warriors are well adjusted in body

- Upward of 80 percent of WWP alumni are overweight or obese.
- Alumni with obesity are more likely than other alumni to:
  - Report that their health is fair or poor.
  - Report greater limitations to their daily activities and work due to their physical health.
  - Exercise less than twice per week.

What Employment Challenges Face Wounded Warriors?

Each year, Wounded Warrior Project (WWP) conducts an annual assessment of its members (alumni) to understand how well its programs and services are supporting the mental, physical, and financial well- being of alumni.

WWP asked RAND to analyze the 2013 survey results to understand the challenges alumni are facing. Results may be used to assess, develop, or tailor programs and services for this group.

WWP strategic objective 3: ensure that Wounded Warriors are economically empowered

- 52 percent of alumni are employed.
- 18 percent are unemployed and looking for work.
- 36 percent are out of the labor pool (i.e., unemployed and not looking for work).
- Many alumni have access to government benefits to promote economic and educational empowerment, but many alumni do not use these benefits.
  - Only about 9 percent of alumni with a VA disability rating of 10 percent or greater report using the VA Vocational Rehabilitation and Employment Program (VR&E)
  - Only 17 percent of alumni reported using the Post-9/11 GI Bill.
- WWP alumni with VA disability ratings of 70 percent or greater are far more likely to be unemployed compared with alumni with ratings of 10–20 percent.

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